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Mountain Communities Wastewater Management Alternatives Report. Volume 3 Institutional Management Alternatives

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Volume III of the Alternatives Development Report is comprised of Chapter 4--´Institutional Management Alternatives´. This chapter developes and describes institutional management systems which may be implemented to meet the wastewater treatment and disposal needs of mountain communities. Fact sheets describing the key components of each system are also included. This chapter includes a discussion of the various functions which must be carried out by a management agency and techniques or methods which can be employed to successfully accomplish these functions.

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Mountain Communities Wastewater Management Alternatives Report

Volume III - Institutional Management Alternatives

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV - ATLANTA

MOUNTAIN COMMUNITIES WASTEWATER MANAGEMENT ASSESSMENT

ALTERNATIVES REPORT
VOLUME III

NOVEMBER 1984

VOLUME III

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VOLUME III

INTRODUCTION

Volume III of the Alternatives Development Report is comprised of Chapter 4--"Institutional Management Alternatives". This chapter developes and describes institutional management systems which may be implemented to meet the wastewater treatment and disposal needs of mountain communities. Fact sheets describing the key components of each system are also included. This chapter includes a discussion of the various functions which must be carried out by a management agency and techniques or methods which can be employed to successfully accomplish these functions. The final section of this chapter presents a method for selecting an appropriate management system for a community.

VOLUME III

CHAPTER 4

INSTITUTIONAL MANAGEMENT ALTERNATIVES

4.1 Introduction

This chapter of the Alternatives Development Report discusses institutional management systems which may be employed to meet the wastewater treatment and disposal needs of mountain communities. As identified in the previous study report these needs are unique, and conventional institutional mechanisms have not always been successful in addressing them. Few 201 Plans have been implemented in the study area and of those that have, most are in the larger communities. One primary reason for this is the lack of institutional organization in the smaller, less affluent mountain areas. Small communities simply do not have the necessary agencies and expertise to undertake conventional, large-scale planning and construction projects. Many of the communities in the study area do not even have sufficient manpower and skills to assume the responsibilities required by EPA under alternative, smaller scale wastewater management techniques such as management of on-site systems. Also, statutory and regulatory requirements may place further limits on the ability of a community to carry out certain management functions.

The following sections of this chapter present information about a range of institutional management systems including a number which may better meet the unique needs of many mountain communities. Section 4.2 describes the various functions which must be performed as part of any overall management system to successfully manage community wastewater needs. A number of alternative techniques which may be used to carry out the functions are also described. A technique is a single method or procedure which can be used to achieve a specified goal or, in this case, which can be used singly or together to carry out management functions (as described in Section 4.2). Each of the functions may be performed by a different public or private entity depending on community goals and the structure of the overall management system which is selected by the community.

Section 4.3 addresses the various institutional arrangements which may be used to carry out the required management functions. This section is designed to address generic types of management systems and is not intended to cover every specific system alternative which may be available. Every management system that is implemented will probably be unique, with different functions being performed by different entities.

The final section, 4.4, describes a three-step methodology which may be used to select an appropriate management system for a community. This process is based upon identifying the communities' needs; environmental, political and socioeconomic limitations and strengths; defining management objectives in terms of which functions will be performed and by whom; and then selecting an overall approach to carry out the management functions.

In putting this chapter together, a great deal of information was utilized when possible from existing sources. In particular, the following publications, noted in the bibliography, were extremely useful: U.S.EPA, 1979; U.S. EPA, 1980; and U.S. EPA, 1983.

This chapter does not present specific, detailed costing information for each of the management alternatives discussed. This cost data will be provided, however, in the final report.

4.2 Management Functions

The proper management of wastewater systems requires that an institutional management system be established which has sufficient capabilities to perform or have performed a variety of functions. The management functions listed here are activities which are necessary to maintain adequate public service and to guarantee long-term performance of wastewater systems. These functions are:

- problem identification
- system planning and design
- construction and installation
- permitting
- operation and maintenance
- monitoring and compliance
- training and public education.

There are various techniques which may be used to carry out these functions. The approach which is actually used will vary from one community to the next based upon the community goals, management system selected and capabilities of the community.

The following section describes examples of ways in which these functions can be carried out. It is not necessarily meant to be all-inclusive.

4.2.1 Problem Identification

Problem identification is necessary to substantiate the existence of wastewater treatment problems and define the nature of present and future system needs. Problems can be identified via surface or groundwater sampling, various survey and remote sensing methods and other techniques. The following are descriptions of some of the different ways of identifying areas of inefficient wastewater management. The following are examples of methods used to identify wastewater treatment problems.

Sanitarian Surveys

A sanitarian survey generally consists of resident interviews, visual site inspections and, if necessary, water supply inspections. The objective of the survey is to collect and analyze data to assess the need for improved wastewater facilities in unsewered areas and also to assess on-lot suitability of locations proposed for development. Several specific objectives can be achieved through the survey:

- identification of possible sources of water quality and public health problems,
- evaluation of causes of system malfunction,
- assessment of the feasibility of the continued use of on-site systems or of new systems,
- provision of information on types and frequency of malfunctioning systems,
- collection of data on individual properties and their on-site systems for future use.

The sanitarian survey process includes preparation, on-site inspection, homeowner questionnaire and data analysis. The survey may also include well or spring inspection; water supply sampling and analysis; sampling and analysis of surface water receiving wastewater effluent; and soil sampling and analysis. The survey also may include inspection of streams, drainage ditches, tile fields and lakes and ponds on or adjoining the property for signs of illegal discharges, nutrient enrichment and possible impact on drinking supply.

Water Quality Sampling

Since the contamination of surface or groundwater is a potential consequence of a malfunctioning on-site system or centralized treatment system, the sampling of those waters is a possible method for validating

the existence of a problem. Although, generally not in itself a determinant of wastewater treatment problems, water quality sampling in conjunction with other methodologies (i.e. sanitarian surveys) can be used to confirm the existence of a problem. Surface water quality sampling is used in the case of a centralized system disposing to a surface water and also in the case of on-site systems with direct disposal to a surface water. Groundwater sampling (well and spring) generally is used to confirm potential contamination from on-site systems.

Aerial Photography

Aerial photography can be used to provide data on surface malfunctions of on-site systems. Once the photos are obtained on-site malfunctions can be defined quickly without intruding on private property. The process has three steps, involving photography acquisition, identification of suspected malfunctions and subsequent field checking of those malfunctions.

Water Meter Installation

This technique involves purchasing and installing water meters to monitor the volume of water released, particularly into a septic tank system. This is a method that can determine whether the use of excessive amounts of water are contributing to on-site system malfunctions. This technique involves reviewing the theoretical water usage of a family based on size, age and hygenic habits and comparing this figure to the actual metered water usage to determine whether water usage may have been excessive. It may be possible to install the meter for only a short period of time and then reuse it elsewhere.

4.2.2 System Planning and Design

Planning and design of needed wastewater facilities are the management functions which are carried out after problems have been identified

and needs defined. The two functions are separate activities but are often combined and performed by the same entity. Planning involves developing an overall approach to meeting the community's water quality and wastewater disposal needs. Preparation of the plan requires the delineation of a study area which may encompass a number of communities, one community or only a specific sub-area within a community. The planning process includes the assembly and analysis of data on cost, performance and design criteria for alternative wastewater facilities; and the collection and review of environmental information and land development trends. The relative suitability of alternative systems is then determined based on a comparison of design criteria and study area needs and environmental characteristics. A system is then selected which is cost-effective and environmentally acceptable and implementable without excessive operating requirements.

Once a system has been selected, design activities are begun. This involves preparation of plans and specifications showing the type, size and location of facilities to be constructed which will treat and dispose of wastewater in an acceptable manner. If numerous individual, on-site systems are proposed in the plan, the design activities may also include a site-specific assessment of new or replacement facility needs and a detailed site assessment. Examples of methods which may be used for planning and design purposes are discussed below. There are additional planning methods which include the same activities but not as part of a generally recognized procedure.

Sewage Official

A Sewage Official is an individual responsible for issuing permits for small-scale wastewater treatment and disposal facilities, in addition to a number of other duties in the system application, evaluation and inspection process. These individuals, frequently referred to as Sewage Enforcement Officers (SEO), sanitarians or health officers, are generally in charge of soil/site investigations, conducting and/or reviewing soil

tests, reviewing designs and performing inspections during the construction process.

In many states, these officials are licensed or certified following rigorous training in the fields of soils, geology and wastewater management techniques and practices applicable to their respective areas of jurisdiction. Generally, an individual who wishes to become a Sewage Official is trained, examined and licensed usually, but not necessarily always, at the state level.

Perform Site-Specific Analysis for Determination of Appropriate On-Site System

This technique involves performing a site feasibility analysis, which includes a soil survey, topographic survey, and a land use and geologic analysis. At a larger level, it involves collecting site-specific data through a sanitary survey, well sampling, septic tank inspection and soil sampling. These procedures may be used to determine the most appropriate on-site system and location.

201 Wastewater Facilities Planning

The 201 planning process is pursuant to Section 201 of the Clean Water Act of 1972, 1977, and 1981 Amendments and is generally referred to as the Construction Grants Program. The purpose of Section 201 is to assist communities in developing and implementing wastewater treatment plans and practices through a three step process. In entirety, the grant process involves funding the planning, design and construction of a treatment system. Of interest here is Step 1, Facilities Planning, which involves receipt by a community of a grant to perform preliminary planning and engineering and also Step 2, system design. To apply for a Step 1 grant, a community must submit the following items to the applicable state agency: 1) a Plan of Study, 2) clearinghouse comments about the proposed project, 3) application, EPA Form 5700-32, and 4) the selection of a professional engineer. Following receipt of a Step 1 grant, the grantee must prepare a facilities plan which includes the following key elements:

- discharge or effluent limitations,
- existing and future study area conditions,
- description and evaluation of costs, operation and implementation of possible wastewater alternatives including innovative and alternative technology,
- municipal pretreatment program (if domestic & industrial wastewater will be treated),
- Infiltration/Inflow (I/I) Analysis,
- Sewer System Evaluation Survey (SSES),
- environmental evaluation of each alternative,
- public participation program,
- archaeological investigations,
- selection of preferred alternative,
- if necessary, intermunicipal agreements.

Once completed, the plan is submitted to the regional or state clearinghouse for comments. If any negative comments are received, potential mitigation measures must be described. Next, the plan and all comments received on it must be submitted to the applicable state agency for approval.

Following approval, the grantee may apply for a Step 2 grant for facilities design. If awarded, the applicant must consider the following technical and administrative items:

- project design,
- project specifications,
- project cost estimates,
- continue development of the facility's Plan of Operations, the SSES and the User Charge Systems.

The completed plans, specifications and estimates should be submitted first to the respective State for review and approval prior to being sent to EPA. Following approval, the grantee may apply for a Step 3 Facilities Construction Grant. A number of activities, in addition to the actual

construction, are involved in the construction process following awarding of the grant:

- bid advertising,
- receipt and review of bids,
- changes in grant amount,
- protests,
- award of construction contracts,
- preconstruction conference,
- construction schedule,
- change orders,
- on-site inspection,
- grant payments,
- audits.

For small communities (population 25,000 or less) with small projects ($4 million or less) a combination Step 2/3 grant to cover design and installation costs may be applied for to help the process.

In order to qualify for a Step 1, facilities planning grant, an applicant must; 1) be a public body created under state law, 2) have as a principal responsibility, the treatment, transport, or disposal of liquid wastes of the public in a particular geographic area, 3) have the legal authority to construct and manage the proposed facility, 4) be the designated agency identified in an approved Water Quality Management (WQM) Plan (where applicable) and, 5) have a project on the state priority list.

The 1981 Amendments to the Clean Water Act incorporated significant procedural and administrative revisions. One of these changes dispensed with grants solely for facilities planning and design (formerly Step 1 and Step 2 grants). Under Section 3 of the 1981 Amendments, grants for Step 3 would include an allowance for facilities planning and design which can be advanced to small community grant applicants which otherwise would, as judged by the state, be unable to prepare a facilities plan and design. The 201 process, however, as described in previous paragraphs can still be considered a valid model for facility planning.

Land Management

Land management is an important, if not sometimes critical, wastewater management technique. Development of a conventional septic tank or alternative on-site system on an inadequate size lot or in an area which does not have sufficient physical means for treating wastewater can pose a real threat to ground and surface water quality (as well as other natural features) and ultimately to the health of those involved. Additionally, construction of small-scale centralized sewer systems can have a significant, and often-times unwanted, impact on land use by encouraging future development.

These impacts can be controlled by including a land management function. This function could be provided in one of two ways: through coordination with existing agencies or by developing land management responsibilities within the management agency. The following land management tools could be implemented to restrict the use of on-site systems, thereby lowering the potential for significant adverse consequences:

- establish minimum lot size zoning requirements and usage restrictions,
- regulate development through subdivision review and approval,
- designate areas potentially sensitive to soil-dependent systems based on the county soil survey results,
- regulate local improvements that may have an impact on the management agency such as schools, parks, road and drainage construction/improvements.

At a minimum, the following items should be included as part of the land management function:

- physical features survey, including soils, climate, topography, geology, and water quality survey,
- aesthetic/cultural survey,
- biological survey,
- evaluation of land development trends/patterns and expected growth,

- identification of location and density of noncentral systems and proposed utility extensions,
- identification of current regulations and institutions,
- socio-economic evaluation, e.g. population, employment, tax base, household size, etc.

Implementation of measures such as these can assist management agency personnel in more efficiently performing their respective jobs. For instance, if a management or other agency has previously designated areas which are sensitive to soil-dependent systems, fewer financial and personnel resources are expended in performing site investigations.

4.2.3 Construction and Installation

Construction and/or installation management functions are those functions necessary to ensure that the centralized or on-site system is constructed or installed in conformance with approved plans and specifications and/or acceptable engineering practice. These functions can consist of developing guidelines and procedures for installation review, field supervision of installation and construction, establishing and implementing installer licensing, training and certification programs and establishing and implementing a construction permit program.

Construction/Installation Permit Program

This function is described also under the following section on permitting. Implementation of a construction permit program will ensure that proposed system construction or existing system repair is performed according to specified standards and approved designs. An installation permit program includes the review and approval of system design and a site evaluation before granting of the permit. A prerequisite to developing a construction or installation permit program is the development of guidelines or standards by which an installation or construction procedure is reviewed. The installation or construction practice must conform to these standards to be considered permittable. Permit fee ranges for study area states are listed in the 'Permitting' section.

Sewage Official

As discussed under Planning and Design, the Sewage Official can be responsible for an on-site wastewater system from system planning to actual installation. The Sewage Official, termed a sanitarian, health officer or Sewage Enforcement Officer (SEO), is an individual qualified to supervise the installation of the system thereby helping to ensure that installation practices conform to specified standards and approved designs.

Installer Training Program

This function is also discussed as a public education management function and involves developing and implementing a training program for system installers to allow them to perform their service with maximum effect and efficiency by conforming to installation standards.

Installation/Construction Field Supervision

Supervision of installation or construction of wastewater facilities is crucial to ensure that any design changes made necessary by unforeseen natural or other occurrences are handled correctly. Supervision also ensures the use of proper installation practices.

Wastewater Personnel Certification Program

This methodology is described in detail as it affects all system personnel in the construction and installation process. It involves developing and implementing a training and certification program for system installers to allow them to perform their service with maximum effect and efficiency, conforming to installation standards.

4.2.4 Permitting

The permitting functions described in this section are designed to ensure compliance with predetermined standards before, during and after construction or installation through requirements for various permits or licenses. Permitting as a function for ensuring compliance is not to be confused with "Compliance" as a function, which consists solely of enforcement methods. The following are examples of permitting methodologies.

Homeowner Permit Program--"Permit-to-Operate"

A "Permit-to-Operate" is basically a permit granted to system owners which is designed to ensure that the system is operating properly and that proper maintenance procedures are being followed. The permit can be issued on an annual or biannual basis, contingent upon the user providing information about the system's operating condition and about maintenance procedures (i.e. septage pumpage records) which have been taken. The management agency may institute a regular on-site inspection program to determine condition of the system. If a system is not operating properly a permit can be refused, and enforcement measures (described in a later section) may be implemented.

Wastewater Personnel Certification Programs

Development of a certification program ensures proper installation, operation and maintenance of an on-site system by requiring site evaluators, soil testers, system designers, system installers, system inspectors and septage pumpers and haulers to be certified. These programs can effectively regulate the type of individual involved in wastewater management, thereby ensuring that only qualified personnel perform the various tasks. Certification requirements can include previous education/ experience and periodic enrollment in training programs to improve skills. The program should also contain provisions for revoking of certification should an individual fail to comply with wastewater management regulations.

Yearly Homeowner Revocable Operating License Program

This technique is similar to, and may be used in place of, the homeowners "Permit-to-Operate". A homeowner would be responsible for obtaining a license to operate an on-site system. The homeowner must produce an approved location and system type before the license is granted. The homeowner would also have to provide some form of proof that the system was inspected at least every two years, to ensure compliance with any applicable standards and regulations. This requirement could be met

through an inspection by the management agency, or submission of an inspection report from a certified private contractor. At this time the license will or will not be renewed. The license can be revoked at any time. An active recordkeeping system is critical to the effective operation of an operating license program.

Occupancy Permit

These permits are issued after the final system installation inspection and are designed to ensure that occupancy of the structure does not exceed the on-site system's capacity. These permits are required each time the property changes owners.

Construction/Installation Permit Program

Implementation of a construction permit program will ensure that proposed system construction or existing system repair is performed according to specified standards and approved designs. An installation permit program includes the review and approval of system design and a site evaluation before granting of the permit. A prerequisite to developing a construction or installation permit program is the development of guidelines or standards by which an installation or construction procedure is reviewed. The installation or construction practice must conform to these standards to be considered permittable.

Currently, in Alabama and in South Carolina counties, there is no standard fee for a septic tank installation permit, although a few counties in Alabama may charge a minimal fee. In Georgia, permit fees are set by each district health department. These fees range from $10 to $150, although a few districts charge nothing. In North Carolina counties, fees range from $0 to $25. By Kentucky law, local health departments can charge up to $100 for a permit. More may be charged if the local Board of Health applies to the state, and, in fact, county fees in the state do range from $50 to as high as $200 or more. This fee covers the initial site evaluation (sometimes two or more visits) and the final inspection and issuance of the

certificate of completion. Some Kentucky counties have indicated that their actual permit program costs can run as high as $400/site, while others noted a cost as low as $66/site. It is felt that an across-the-board county fee of $150/site would cover actual program costs. In addition, in Kentucky there is a $9 state fee per site. This fee covers a number of activities, including in-field consultations with local inspectors, if necessary. In Tennessee, each county assesses a $35 permit fee per site, which covers the initial inspection by the local health department official and any subsequent visits. In addition, if deemed necessary, a site evaluation will be performed by a soil scientist for a fee of $40/lot (or a $25 fee for a subdivision and then $15 for each individual lot).

4.2.5 Operation and Maintenance

Cost-effective and efficient use of a wastewater treatment system involves implementation of both a routine and an emergency maintenance program. Routine maintenance is a function not widely performed but if performed periodically, can ensure satisfactory system performance and prevent premature system failure. Regular system maintenance prevents on-site system failure, thereby decreasing sewage exposure, water pollution and nuisance complaints. In addition to the following methods, the issuance of a "Permit-to-Operate" as described in the section on permitting may also be considered an operation and maintenance function because implementation of a routine maintenance program should be an important step in obtaining an operating permit or license. Also, attaching the operating permit to the property deed is a way of ensuring routine maintenance. This technique is described in the monitoring and compliance section as a method for enforcing maintenance action ("Deed Attachments"). The following are examples of operation and maintenance methodologies.

Routine Preventive Maintenance Program

The first step in developing a routine, preventive maintenance program is to locate and identify all existing on-site systems within a given

"planning" or "study" area, noting age, last date of maintenance, and location of the cleanout part of the tank. Also included should be a homeowner interview to determine if system problems are occuring, an inspection of the system for evidence of past and present malfunctions, checking of septage pumpage records and perhaps sampling of well or surface water downstream from the site. Next, an inspection of the solids build-up in the tank should be made to determine whether it is necessary to remove accumulated solids, scum and liquids. Tank pumping, cleaning diversion valves, line cleaning and unclogging, "resting" periods, or even system replacement should be part of the maintenance program. The inspection portion of the program is recommended initially to be made once every two years. At a later point, the schedule may be modified to compensate for other factors which affect system performance such as tank size and number of people in the household served.

Emergency Maintenance Program

Guidelines for an emergency maintenance program may be limited to those malfunctions which pose an immediate threat to public health or to ground or surface water quality, and can consist of having qualified individuals on call to do an emergency system inspection and perform maintenance procedures.

Septage Collection and Disposal Program

This technique consists of developing policies and regulations to help ensure that septage and sludge are properly collected, transported and disposed of in an environmentally sound and safe manner. The program can include:

- training, licensing and certifying involved individuals,
- periodic inspection and certification of all vehicles used to transport residuals,
- limiting the disposal of residuals to approved sites,
- regulating the method of disposal,
- operating and maintaining disposal facilities in accordance with prescribed performance standards.

The program can be developed to include customers on either an areawide or countywide basis.

Flow Reduction Program

A flow reduction or water conservation program can be developed as part of an overall maintenance program. In the case of on-lot systems it might first be necessary to install water meters or tracking devices to determine whether excessive water usage is a problem. As part of the flow reduction program, low-volume flush toilet tanks, low-flow showerheads, low-flow faucet aerators and suds-saver washing machines could be installed to reduce water usage, resulting in reduced hydraulic overload and increased efficiency of septic tanks and treatment beds. Also, a leak detection survey and repair program can be implemented as part of the flow reduction program in areas using either on-site systems or served by a centralized or small community system.

To implement a successful flow reduction program, changes to building codes may be needed to require water saving fixtures and devices in new construction. To implement such a program in existing structures, co-operation will be needed between the implementing agency and the citizen. Citizen education is also necessary for successful program operation.

Implement Homeowners Warranty (HOW) Program

The HOW program was established in 1974 by the National Association of Home Builders (NAHB) in an attempt to resolve homeowner complaints about defective new homes without governmental intervention. HOW offers warranty and insurance on homes constructed only by HOW members, although many other similar warranty programs backed by insurance have been developed. The federal government also provides some warranty protection.

Involvement by the HOW Corporation with on-site wastewater systems is primarily limited to well and septic systems and/or municipal water and sewer services for single family homes and low rise condominiums. System performance is warranted as it relates to HOW-approved standards.

Use of Maintenance Permit Forms

The maintenance permit form is a method used to both remind and require the homeowner to determine, at given intervals, whether their system needs to be pumped. Such a requirement may be included as part of the individual permit, since the period between pumpings will reflect that individual homeowner's tank and use characteristics. The maintenance permit form would be mailed to the homeowner every one, two or three years (depending upon tank and use characteristics) requiring a licensed septage pumper to inspect the tank and pump it if necessary. The pumper would then sign the form and return it within a given time period, indicating whether the tank was pumped. This action would validate the homeowner's permit.

Distribute Reminder Notices in Routine Mailouts

This method involves periodically notifying the homeowner of the need for normal system maintenance. Individuals can be notified through routine mailouts, such as tax notices, water bills, etc.

Plot Plan Submission

This technique involves requiring applicants for on-site waste disposal system permits to submit a plot plan indicating the location of the system and showing distances to buildings, roads, lot lines and other markers. This method familiarizes the homeowner with the system and its location, saving time and expense during inspection and maintenance procedures.

Installation of Service Call Light System

A service call light unit is a monitoring methodology used to alert the homeowner to the need for maintenance of his on-site system. The service call light is connected to the unit and activates when the water in the pump chamber reaches a predetermined level. A plate is installed on the light unit and contains a service number to call when the light is on. After the

service number is called, the customer should be reassured that there is no cause for immediate alarm and that someone will respond within several hours. This is another method of ensuring proper and routine system maintenance.

Develop Wastewater System Inspector/Sanitarian Certification Program

This technique involves developing and implementing a program to instruct an individual in pre-installation evaluations (including recognizing adverse soil, geologic and topographic conditions) and post-installation regular inspection (recognizing the consequences of a malfunctioning on-site system). The inspector or sanitarian after successfully fulfilling program requirements would be issued a certification, good for a predetermined length of time. The benefits of implementing such a program include more efficient system inspections and more effective and timely maintenance.

Implement Wastewater Treatment Plant Circuit Rider Operator

This technique involves appointing one trained person responsible for overseeing the operation and maintenance of some or all municipal or small community systems in a given area. This person may be assisted, when necessary, by employees of system owners. Other responsibilities of the circuit rider operator could include stockpiling and distributing parts and supplies, taking samples and overseeing their delivery to a lab for analysis and acting as an ombudsman.

Establish Detailed Maintenance Management Program

This technique is applicable to a small community or centralized wastewater treatment system. It involves implementing a systematic and comprehensive maintenance program to keep the facility operating efficiently without interruptions, and to preserve the substantial capital investment in equipment, structure and control systems. The program should

include three elements: asset management, inventory and control, and records and monitoring.

Asset management refers to establishment and maintenance of records for each piece of equipment. This record system should include:

- equipment description
- manufacturers equipment (name plate) data
- spare parts and material required to maintain the equipment
- inspection and lubrication records
- preventive maintenance records
- repair records.

The following financial data should also be included as part of asset management:

- date of acquisition
- costs
- maintenance and repair cost
- labor hours
- useful life.

These equipment records should be kept up-to-date routinely, requiring total commitment of staff (chief mechanic or record clerk) to record maintenance data as the tasks are completed, and periodic reviews by the utility manager to ensure that records are kept up-to-date.

The second part of a maintenance management program is the development of a spare parts inventory and control system. This system is essential to the effective management of a facility through:

- assuring the availability of necessary spare parts and materials for both preventive and corrective maintenance
- maintaining optimum quantity levels
- monitoring quality
- minimizing the cost of carrying excess parts.

In order to maintain an efficient inventory system, all items need to be identified, classified and a control system should be developed. The classification system can be based on such things as cost, usage, delivery time, shelf life, and impact on plant operations. Quantities and reorder policies need to be established, particularly to ensure an adequate supply of the most critical spare parts.

The inventory control system should include:

- item identification
- units of measure
- purchasing lead time
- stock requirements
- reorder points
- quantities on hand
- cost.

The final element in the maintenance management system is the establishment of a process for reporting and monitoring the maintenance program--the "work order" system. This is a structured procedure which is used to initiate all preventive and corrective maintenance activities (above certain time requirements) and to ensure that all tasks are completed in a timely manner.

Implement a Comprehensive Energy Management Program

The implementation of a comprehensive energy management program is essential to efficient management of a centralized or small community wastewater treatment plant. The aim of such a program is to plan, monitor and control energy usage and cost without sacrificing facility operations. In order to develop such a program, the utility manager must sufficiently understand energy usage in his operation, must have developed adequate baseline data (such as for energy consumption, cost, operating procedures

and design conditions), and have reviewed operating and maintenance procedures to determine the impact on energy management alternatives. The utility manager should also become familiar with the billing system used to assess energy user charges.

4.2.6 Monitoring and Compliance

The purpose for implementation of monitoring procedures is to observe overall system performance through periodic water quality monitoring or through routine inspection. Regular monitoring will also help to detect system failures as early as possible thereby preventing potentially serious impacts. Compliance procedures are necessary to ensure that a system is conforming to predetermined standards for safe and efficient system operation. These procedures basically consist of enforcement mechanisms. Examples of monitoring and compliance methodologies are described here.

Perform Periodic Monitoring of Well, Spring and Other Waters

This is a preventive maintenance technique involving periodic sampling of well or spring water to determine if contamination from on-site systems is occuring, generally conducted to comply with permit requirements. Parameters to sample for could include fecal coliform, fecal strep, pH, total suspended solids, total dissolved solids, hardness, turbidity or color, temperature, taste or odor, and toxic substances. The parameters sampled depend upon the particular case.

Perform Periodic System Inspections

The performance of routine inspections can be part of a regular biannual maintenance program as described in the previous section or it can be conducted at shorter intervals. An inspection program can consist of checking a system for evidence of past and present malfunctions, checking of septage pumpage records, and inspecting the solids buildup in the tank. At this point system maintenance can be initiated, if necessary. A checking of

soils, water bodies for signs of nutrient enrichment and checking for odors can also be part of the inspection program.

Use of Violation Orders

This is an administrative technique designed to force an individual to bring his/her on-site system up to compliance with local standards or regulations. The technique involves providing a violator with a written notice stating that a violation exists and giving the violator a specified period of time in which to correct the violation. Noncompliance with a violation order may result in criminal prosecution, court issuance of an injunction or similar penalties. The violation order is just one of the enforcement measures which can be used to bring a "failing" system into compliance, as discussed previously under the "Permit-to-Operate" system.

Use of Injunctions

The use of injunctions is another enforcement method involving issuance of a court order to an individual to perform or refrain from performing a specified act. This technique may be more effective than a penalty in correcting a violation because it involves a specific court order rather than just a fine or a citation.

Failing On-Site System Citation Reports

This technique involves issuing violation tickets or citations to a person in violation of regulations. It is similar in concept to traffic tickets and allows quick enforcement action to be taken.

Deed Attachments and Restrictions

These techniques invclve attaching specific instructions or other information regarding the on-site system directly to a deed. A deed attachment refers to a list of violations of the system on the property in

question being attached to the property deed. A deed restriction is a method of gaining access to that property.

Bonding, Performance and Personnel

Performance bonding involves issuing a bond guaranteeing the performance of a system or piece of equipment for a given length of time (typically one year). The bond guarantees satisfactory performance of a system during that period. A performance bond lowers the level of risk to the user, the installer or other parties that the system will fail due to inadequate installation.

Personnel bonding requires the personnel involved in the installation, design and maintenance of on-site systems to be bonded. Such personnel may include system designers, installers and evaluators, soil inspectors and septage pumpers and haulers. Through bonding, personnel accept the responsibility to perform services within required regulations and standard practices of their profession. Failure to do so may result in forfeiture of the bond. Bonding protects the system user and management agency from incurring costs of repairing systems that have failed because of improper practices by the personnel involved.

Termination of Occupancy/Water Services

These enforcement actions can be applicable if, after repeated notices (i.e. after issuance of "Failing On-site Disposal System Citation Reports"), a homeowner refuses to repair a failed system.

System Replacement

Again, if a homeowner refuses to have a failed system repaired after several notices, an option is to contract with an engineer and contractor to design and install a replacement system. Costs for the engineer and contractor could either be billed to the homeowner or placed as a lien against the property.

Condemnation Proceedings

This procedure involves condemning a property with a failed system as unfit for human habitation. Condemnation proceedings are generally used only when other corrective measures have failed and where serious health threatening problems remain unabated.

Submit Schedule of New Connections, Extensions and Hook-ups

Municipal wastewater treatment plants are subject to the National Pollutant Discharge Elimination System permits (NPDES) created by Section 402 of the Clean Water Act of 1972. Overloading of treatment works which, in turn, can cause a violation of the NPDES permit, is a continuous threat to the proper functioning of the facilities. One method of controlling system loading is to require the NPDES permittee to develop a schedule of new extensions, connections and hook-ups of new sources to the treatment plant over the duration of the permit. This schedule should be consistent with current land use plans, open space plans, official zoning maps, and/or capital improvement budgets of involved agencies. This procedure can also involve submittal of an annual report to the state, EPA and local agencies tracking the actual rate of hook-ups, connections and extensions compared to the agreed-upon schedule. Hence, the schedule is periodically revised. This methodology allows the permittee and government officials to track system hook-ups, thus possibly avoiding system overloads.

4.2.7 Training and Public Education

The objective of the training and public education function of wastewater management is to inform and educate sanitarians, plant operators, and other professionals, field personnel and the general public on the correct or appropriate operation and maintenance techniques for on-site systems, on the public health impact of failing on-site systems, and on how to recognize a failing/failed system. In addition, an educational program can obtain community support for an on-site management program by informing

the public of the cost and other benefits of a routine O&M program. The following are examples of methods which can be used to accomplish an effective training and/or educational program.

Conduct Public Meetings, Classes, Workshops, and/or Seminars for Homeowner Instruction in System Maintenance and Public Health

This technique involves setting up and conducting meetings, classes, workshops or seminars to instruct the public on the need for proper operation and maintenance of their on-site system. Topics which can be discussed include homeowner responsibilities, public health/water quality impacts, water conservation methods, system inspections and how to recognize a failed system. Education can be accomplished through a number of methods including slide presentations, informal discussions, handouts, etc.

Conduct System Maintenance and Public Health School Programs

This technique is basically the same as the technique previously described, except that it is geared toward school students. The objective is to develop a regular school program or special program to teach students system operation and maintenance techniques, public health and other impacts of a failed system and how to recognize a failed system.

Develop and Conduct Training Programs for Sanitarians and/or Other Professionals and Field Personnel

This involves developing and implementing training programs for personnel involved in decentralized wastewater management to allow them to perform their services with maximum effect and efficiency. A program can be developed for all involved personnel, from the sanitarian to system designers and site evaluators.

This technique can also involve implementation of system management training programs for public officials. In addition, prior to implementation of any wastewater system, the public official should be educated on

the need for marketing the particular program in question. This includes public education programs, classes, workshops, slide presentations, media coverage, etc, as discussed in this section.

Distribute Homeowner O&M Pamphlets, Booklets and/or Brochures With Routine Mailouts (i.e. tax notices)

This technique involves mailing O&M pamphlets, booklets, brochures, or maintenance "tips" to on-site system owners. Mailings should be done on a routine basis, possibly sent with tax notices or water bills. This technique could also include distribution of information on proposed on-site system management through the media (e.g. newspapers).

Require System Manufacturer and/or Installer to Provide O&M Materials to Homeowner

This involves requiring the manufacturer of the on-site system or the system installer to provide to the homeowner operation and maintenance practice information specifically for the system installed.

"Homeowners and Users Guide for On-Site Wastewater Disposal Systems"

This technique involves making a "Homeowners and Users Guide for On-Site Wastewater Disposal Systems" available in do-it-yourself sections of hardware stores. This is an educational method which provides a list of maintenance tips, some do's and don't's for operating the systems and answers questions about the use of on-site wastewater disposal systems.

Provide Homeowner With Detailed Plot Plan

This technique involves providing the homeowner with a detailed plot plan of his property indicating the location and design of the sewage system, location of expansion area, water-well depth, water-table depth and soil type. Provision of the plot plan gives the homeowner information about his system and property he might not otherwise have, thus allowing for more effective and efficient system maintenance.

4.3 Alternative Management System Models

The following section of the chapter presents five models for institutional management of wastewater activities. The five models represent generalized approaches with an increasing level of public institutional management. As such, the assignment of public management functions is somewhat arbitrary so that the least extensive public management is provided under alternative one and the most under alternative five. With certain key limitations, it is possible for any management function to be performed under any of the management systems. There are certainly options for function responsibility and alternative means of implementing functions within each alternative system. Where these options are available they have been discussed.

The five models are useful as a means of organizing this section and describing the possible range of public responsibility for management functions. However, it should be noted that the actual management system which a particular community implements will be unique; based on particular community needs and capabilities.

4.3.1 Conventional Homeowner-Centered Management

Description

Under this approach a private party (typically an individual homeowner) owns, operates and maintains the wastewater system with a public agency (often county or city health department) responsible for ensuring compliance with health regulations. This management system is typically utilized in less highly populated rural areas where conventional septic tank-soil absorption systems are the primary type of wastewater facility. This management system is summarized on Figure 4-1.

Responsibility Centers

Table 4-1 presents a summary of the parties responsible for carrying out necessary functions under each of the five management systems described. As can be seen from the table, under the conventional system, the homeowner and private contractor are responsible for most functions. A public agency of some sort is responsible for a few functions, while others are not carried out at all.

Problem identification is not really the responsibility of any party under this system. Where the health department is the implementing agency, problem areas are not actively sought but complaints will be responded to after a problem has already become apparent.

Planning is also not specifically carried out under this system. Additional systems are installed as needed by private individuals unless permits for them or building permits are denied by local agencies.

Design is generally performed by private septic installation contractors. Often these individuals do not have sufficient expertise to develop adequate designs for difficult terrain, and there is no incentive or requirement to employ a design engineer.

Operation and maintenance are the responsibility of the homeowner. This is often the cause of problems because most homeowners have little or no understanding of the proper operating procedures or maintenance needs of even conventional on-site wastewater facilities. Inadequate O&M by homeowners is one of the most frequent reasons for failure of conventional on-site systems.

Monitoring and compliance are the responsibility of a public agency. However, under the conventional management approach monitoring is usually not carried out. Few health departments have the capability or authority to

TABLE 4-1

RESPONSIBILITIES CARRIED OUT UNDER ALTERNATIVE MANAGEMENT SYSTEMS

System	Problem Identification	Planning/ Design	Construction/ Installation	Permitting	Operation/ Maintenance	Monitoring/ Compliance	Public Education
Conventional Management System	O	O/Y	Y/Y	Z (if any)	X/X	O/Z (if any)	O
Conventional With Monitoring	Z	O/Y	Y/Y	Z (if any)	X/X	Z/Z	O
Private Ownership/Required O&M and Monitoring	Z	O/Y	Y/Y	Z (if any)	X/X	Z/Z	O
Private Ownership/ Public O&M	Z	O/Y	Y/Y	Z	Z/Z	Z/Z	O
Public Sector-Oriented Management	Z	Z/Z	Z/Z	Z	Z/Z	Z/Z	Z

O - No party specifically responsible

X - Homeowner or private entity

Y - Private contractor

Z - Public agency

carry out regular, scheduled system monitoring. Their activities are generally confined to enforcement of health department regulations when a violation is reported.

Public education is another necessary function which is often given minimal attention under the conventional management approach. Some health departments provide pamphlets on system installation and maintenance but that is often the extent of the education effort. There are examples where greater information such as design manuals have been made available and, clearly, this is a more successful approach. Generally, public education is not an activity required by law or local regulation, but is a function which an agency/entity may elect to carry out separately or as part of an overall program.

Resource Requirements

Resource requirements for this type of management system are minimal. In highly rural areas the public agency's responsibilities are often carried out with a small district staff covering a number of counties. Larger counties have individual staffs. Total personnel requirements will vary with the size of the community, but typically will range from as few as two up to five or more. Among the capabilities included are (generally) a department director (sometimes an appointed, non-paying position), one or two registered sanitarians, one or two inspectors, and perhaps clerical and administrative support. Facility and equipment requirements are also minimal and can include a few soil augers and soil survey information. Construction equipment used for installation would usually be owned by a private contractor.

Examples and Contacts

This system is in place in most non-urban communities in the United States.

4.3.2 Conventional System With Monitoring

Description

This system is basically a modification of the conventional management approach. The wastewater facilities are still for the most part privately owned and operated under this alternative but a public agency assumes responsibility for scheduled monitoring as well as permitting and compliance. This type of management system would also be most applicable in low-to-moderately developed areas where septic systems are primarily used for wastewater treatment and disposal; however, it would also be readily applicable to cluster systems owned and operated by a homeowners association or other private organizations. Figure 4-2 summarizes the various information on this management system.

Responsibility Centers

Overall responsibility for management functions under this system are more evenly split between the homeowner, private contractor and public agency than with the conventional system. The health department is still the public agency most likely to have responsibility for public management functions under this system. In some communities, however, (see Section 4.4) another form of public agency such as a special district or authority may be necessary in order to have adequate powers to carry out monitoring.

Problem identification is not often a strong function under this management system. It is unlikely that any formal program for water quality sampling, aerial survey or other problem identification activity would be carried out by a public agency as part of this alternative. However, some problems and potential problems would be identified by the public agency through the system monitoring process.

Responsibility for planning is still not necessarily assumed by any party under this system. System design is, again, carried out mostly by private contractors with the same limitations as noted in 4.3.1. However,

if the responsible public agency has the necessary authority and staff capabilities, it could choose to provide design assistance.

Operation and maintenance are performed by a private homeowner or association. This activity would vary little from the procedure as carried out under the conventional management system. But, with the benefit of information from the monitoring program, it would often be possible to carry out necessary maintenance before a system failure occurs.

Monitoring and compliance are the major responsibility of a public agency under this system. By performing scheduled monitoring of system operations, the public agency would be able to greatly increase the performance of wastewater systems. Although the public agency is responsible for the monitoring activity it is not necessary that the agency itself carry it out. There are a number of alternatives to monitoring directly by the public agency.

One alternative is to have the homeowner monitor the system himself and then provide the management agency with some certifiable results. Another approach would be for the agency to delegate the monitoring responsibility to a private contractor who would report back with the results.

Under either of these options, it is most likely that the public management agency would retain responsibility for any compliance actions resulting from the monitoring. As under the conventional management system, it is probable that enforcement actions would be confined to responses available under existing health regulations.

Public education activities would also be the responsibility of the public agency. There would be nothing limiting the scope of this activity under this system, though public agencies typically responsible for wastewater management do not often carry out extensive public education programs, as discussed in Section 4.3.1. Since a public education program

is not a required function the public agency or other agency would have to elect to provide such a service. It would be advisable for the management agency, however, to utilize some education/information techniques to inform the public about its monitoring activities, their objective, benefits and how to best take advantage of the monitoring information.

Resource Requirements

Again, as with the first alternative, this approach involves limited resource utilization. Resource requirements are similar with the exception that management of both cluster systems in addition to individual systems may require a larger public agency staff. Monitoring activities would require staff trained in monitoring techniques (i.e. performance of inspections, water quality monitoring) and also water quality monitoring equipment. In addition to these requirements, a department director is needed, one or two registered sanitarians, one or two inspectors and clerical and administrative support. Equipment requirements in addition to that needed for water quality monitoring include soil augers and soil survey information. A private contractor would normally own any construction equipment used for installation and lab work facilities.

Examples

No examples have been identified where a public management agency has assumed responsibility for only the monitoring function for on-site systems. A modified version, however, of the conventional system with monitoring can be found in Madison County, North Carolina. Here, the Health Department is monitoring the performance of new alternative on-site systems which are being installed under a HUD grant. A contact for information on this program is:

Mr. Mike Bradley
Madison County Health Department
Route 7, Box A
Marshall, North Carolina 28753
(704)255-0695

4.3.3 Private Ownership with Required Operation, Maintenance and Monitoring

Description

This system, again, is basically a modification of the conventional management approach. The wastewater facilities are still owned, operated and maintained by a private party (generally the homeowner), however, a public agency is responsible for implementing some procedure for ensuring proper maintenance by the system owner. Additionally, under this alternative the public agency assumes responsibility for permitting and compliance. This is an approach which would be applicable in low-to-moderately developed areas using primarily septic systems for wastewater treatment and disposal. It would also be applicable in areas where cluster systems are owned and operated by a homeowners association or other private organization and perhaps for privately-owned conventional collection and treatment systems. The characteristics of this management system are set forth on Figure 4-3.

Responsibility Centers

Under this system, the responsibility for management functions are divided among the homeowners, public agency and private contractor. Problem identification is still generally not a strong function under this system. The public agency would probably not undertake any formal program for water quality sampling, aerial survey or other problem identification activity. As with the two preceding systems some problems and potential problems would probably be identified by the public agency through homeowner complaints and the system monitoring process.

System planning is not a function necessarily performed by any party under this system. System design is carried out mostly by private contractors with the same limitations as described in Section 4.3.1. Again, design assistance could be provided by the public management agency.

Operation and maintenance are performed by the private homeowner or association. However, under this management system the homeowner must either have knowledge and understanding of proper operation and maintenance techniques and submit proof of maintenance to the public agency or have these maintenance functions carried out by a certified private contractor. This program ensures that proper maintenance techniques are carried out at specified intervals, thus avoiding system failure.

Monitoring and compliance are primarily the responsibility of the public agency under this system. The public agency would inspect systems and monitor them whenever a failure is reported or when the homeowner does not submit proof of maintenance. The only problem with this system is that a failure must occur or maintenance not be undertaken before monitoring and compliance take place.

There are alternatives to public agency monitoring which could also be utilized. For instance, since the homeowner is already involved extensively in system maintenance, he could also monitor the system and provide the public agency with certifiable results using a procedure similar to that for maintenance activities. The agency could also delegate monitoring responsibility to a private contractor who would notify the management agency of the results.

As under the other systems described, compliance responsibility would still rest with the public agency and would probably be confined to enforcement actions permitted under health regulations.

Public education activities, too, would be the responsibility of the public agency although such an activity is not generally required by state or local regulations. Although, public management agencies do not typically carry out extensive education programs, under this management system, the homeowner will need to be trained on proper and adequate operation and maintenance techniques, mainly through formal training classes. Again, the management agency may find it advisable to inform or educate the homeowner on its monitoring activities and related information.

Resource Requirements

Resource requirements are similar to those for the conventional alternative. The public agency staff must be of such a size to sufficiently manage individual systems, cluster and small community systems. It also must be able to efficiently and expertly undertake system monitoring activities (i.e. inspections and water quality sampling) and adequately manage homeowner maintenance activities. To perform these functions a public agency department director is necessary to oversee activities, one or two registered sanitarians (depending on the size of the planning area), one or two inspectors, and clerical and administrative support. Clerical support needed may be greater than under the conventional system approach simply due to additional paperwork resulting from homeowner "proof of maintenance" submittals and/or contractor certifications. Equipment requirements include essentials necessary for water quality monitoring, soil augers and soil surveys. Construction equipment used for system installation and any lab facilities necessary for water quality testing would probably be owned by a private contractor.

Examples

There are no known examples of this management system currently in operation in the study area. An example of a similar system in use in the country is in Marin County, California. The Marin County health department operates a biennial inspection program of existing on-site systems. The homeowner is basically responsible for on-going operation and maintenance, but must submit to a health department inspection every two years. If the system needs repair or pumping the homeowner is responsible and must submit proof of maintenance to the health department.

Another similar system is in place in Stinson Beach, California. The Stinson Beach County Water District manages both new and old on-site and alternative systems. The District is responsible for inspection, monitoring and enforcement. The Stinson Beach County Water District, Water Quality Supervisor is the contact for information on this system.

4.3.4 Private Ownership with Public Operation and Maintenance

Description

This management system takes even more of the responsibility from the private individual or association and gives it to the public agency. In this system, the homeowner owns his system and the public agency has the responsibility for operation, maintenance, and system monitoring and permitting for compliance with pre-set standards. Because of the increased requirements for resources, this type of system is generally feasible only in areas of moderate-to-high use of individual septic systems or use of cluster systems. Figure 4-4 presents a summarization of key features of this system.

Responsibility Centers

Overall, the responsibility for managing the wastewater system lies with the public agency. The private homeowner simply owns the system while the public agency is responsible for operation, maintenance and monitoring of the system.

Problem identification is typically not the responsibility of any single party under this system. Problem areas are generally not sought out on an on-going basis, but the public management agency is responsible for monitoring the system for problems and responding with maintenance techniques when a problem is identified.

System planning is also not typically performed under this management system. Design can be performed by private installers with design assistance from the implementing public agency when necessary.

Operation and maintenance are the responsibility of the public agency. Because the public agency employs individuals qualified in effective

operation and maintenance of an on-site system and because the agency operates on a pre-set, routine schedule, system problems are identified before system failure occurs. The public agency does not necessarily have to perform maintenance activities. Maintenance work may be contracted to private parties (particularly septage pumping and hauling).

Monitoring and compliance are also the responsibility of the public management agency. The public agency generally establishes a routine monitoring schedule which can include regular inspections and/or water quality monitoring. Routine monitoring by trained personnel is also an effective failure - preventing method. System monitoring is designed to ensure that the system is complying with set standards. The public agency is responsible for compliance measures which can range from violation orders to condemnation proceedings (see Section 4.2.6).

Education of local citizens is also primarily the function of the public agency although, as previously noted, it is not a requirement. Since the property owner is responsible for paying the public agency for its services (O&M, Monitoring) then the private homeowner should be aware of the type and extent of services being provided and also how to detect a potential system problem between monitoring activities. Public education is a technique which is generally given very little attention under almost any system. However, the greater the involvement of the public agency, the greater the probability they will provide for education of the public.

Resource Requirements

Resources required for this management system are similar to those for the systems discussed previously. However, due to the increased participation of the public agency in management of the system, more personnel would be required at that level. Again, the staff must be of sufficient size to manage individual, cluster and small community systems. Also, the agency must be able to efficiently and expertly undertake the operation, main-

tenance and monitoring activities associated with the facilities. A public agency department director is necessary to adequately perform these functions by overseeing management operations. Three to five or more registered sanitarians and three to five or more inspectors (depending on the size of the planning area) would be required to adequately perform O&M functions. The sanitarians and inspectors would need to be trained in performing operation and maintenance procedures and monitoring activities (i.e., facilities inspection and water quality monitoring). Clerical and administrative support needed will be greater than for the conventional system approach and possibly even greater than for the modified conventional approach due to the additional activities performed by management staff. Equipment requirements include those necessary for water quality monitoring and for soils inspections (soil augers and soil surveys). Given the number of functions performed by the public agency, it may be cost effective at this point to own construction equipment for installation, repair or for septage pumping and hauling and probably any lab facilities necessary for water quality testing.

Examples

There are no known existing systems of this type in the study area. An example of a system similar to this is one managed by the Georgetown Divide Public Utility District (GDPUD) in Georgetown, California. The District performs site evaluations, design, inspections and monitoring for on-site and alternative systems. The District's Water Quality Superintendent is the contact.

4.3.5 Public Sector-Oriented Management

Description

This system involves complete public responsibility for the wastewater system. The public agency (e.g. a city or county health department) owns, operates, maintains and monitors each system. The property owner, in this instance, becomes the customer, paying the public agency for its services.

This management system is applicable in areas which are moderately-to-highly developed with individual on-site systems, cluster systems, small community systems and conventional collection and treatment systems. Figure 4-5 is a summarization of this management system.

Responsibility Centers

The responsibility for management functions under this system lies wholly with the public agency. Problem identification should be a relatively strong function under this system. Problems with present systems and potential problems with future systems are investigated by the public agency. Once the agency has identified problems and thus defined the needs of the particular individual or community, the agency then becomes responsible for planning the approach to meeting those needs. The public management agency may plan the facilities or may contract that responsibility to a professional engineering firm.

The public agency is also responsible for facilities design. This again is a function which the agency may opt to contract out completely to consulting engineers or system installers.

Operation and maintenance are also the responsibility of the public agency. Since the public agency employs individuals qualified in effective operation and maintenance of on-site systems and because the agency operates on a pre-set, routine schedule, system problems are made apparent before failures can occur and before extensive (and expensive) repair work is necessitated. Under this system, the public agency does not necessarily have to perform operations and maintenance activities for on-site systems. Maintenance activities may be contracted out (particularly for septage pumping and hauling) or may be delegated to the homeowner with adequate supervision.

Monitoring and compliance activities are also performed by the public agency. The public agency develops a routine monitoring schedule which can include regular inspections and/or water quality monitoring. Routine

system monitoring is another effective failure-preventing procedure, designed to ensure that the system is complying with set standards.

Since the public agency has total responsibility for all functions performed under this system, it would also be responsible for carrying out education and training activities. Although these activities are not required, the public agency may elect to perform them. Since the property owner is responsible for paying the public agency for its services, then the private homeowner should know what type of services are being rendered. In addition, the homeowner should know how to recognize a potential problem between monitoring activities.

Personnel resources required at the public agency are more extensive for this system simply because total system responsibility rests with the public agency. Personnel required include:

- department director
- inspectors (soil inspector, water quality monitor)
- sanitarians
- plant operators
- senior engineer
- junior engineer
- environmental planners.

Equipment required includes water quality monitoring tools and facilities, soil augers and soil surveys, septage trucks and other hauling and pumping equipment. Where available, contractors may provide their own construction and other equipment including lab facilities for water samples; however, where large-scale treatment facilities are publicly owned, the equipment requirements will be extensive.

Examples

There are currently no situations in the study area where a public agency is completely responsible for all activities associated with managing on-site or cluster systems. However, this type of management

system is typical of any publicly-owned centralized small community or conventional collection and treatment system in the study area.

One specific example in the study area is the city of Hinesville, Georgia. A treatment plant is being constructed jointly by the city and the Army. Following operation, the city will assume operation for the Army's portion of the plant. A contact is Mr. Billy Edwards, Hinesville City Administrator, (912)876-3564.

Outside the study area, Florida General Development Utilities (GDU), Inc. is a publicly-regulated private utility which owns, operates and maintains septic tank-effluent pump systems at two developments. GDU's Sanitary Engineer in Miami is a contact.

4.4 Evaluation of Alternative Management Systems

The process which a community uses to select a suitable institutional management system involves decision-making on a wide variety of issues. Figure 4-6 presents a diagram of one possible approach to selection of a management system which includes three main steps, a number of considerations within each step and decision-making inputs concerning technical and financial alternatives. The three major steps are:

- development of a community profile and definition of needs
- identification of management objectives
- selection of most appropriate management system.

A discussion of each of these steps follows. The objectives of this section are to demonstrate the use of this selection methodology, to identify community needs and objectives, what the limiting features of each system are, and which system may be most suitable for a given community.

4.4.1 Development of Community Profile and Definition of Needs

The development of a community profile is the first step in the selection process. The objective of this step is to obtain and review sufficient material to clearly define current and projected needs and describe those community characteristics which may limit the range of feasible management alternatives.

The initial data collection and analysis effort should focus on natural and man-made features of the community which affect existing and future wastewater facility needs. The four major categories of information are:

- natural and physical features (e.g. depth to water table, depth to bedrock, lot size)
- existing wastewater disposal techniques
- growth and development patterns
- problem areas where existing systems are presently not functioning properly.

GENERALIZED SELECTION PROCESS FOR INSTITUTIONAL MANAGEMENT SYSTEM

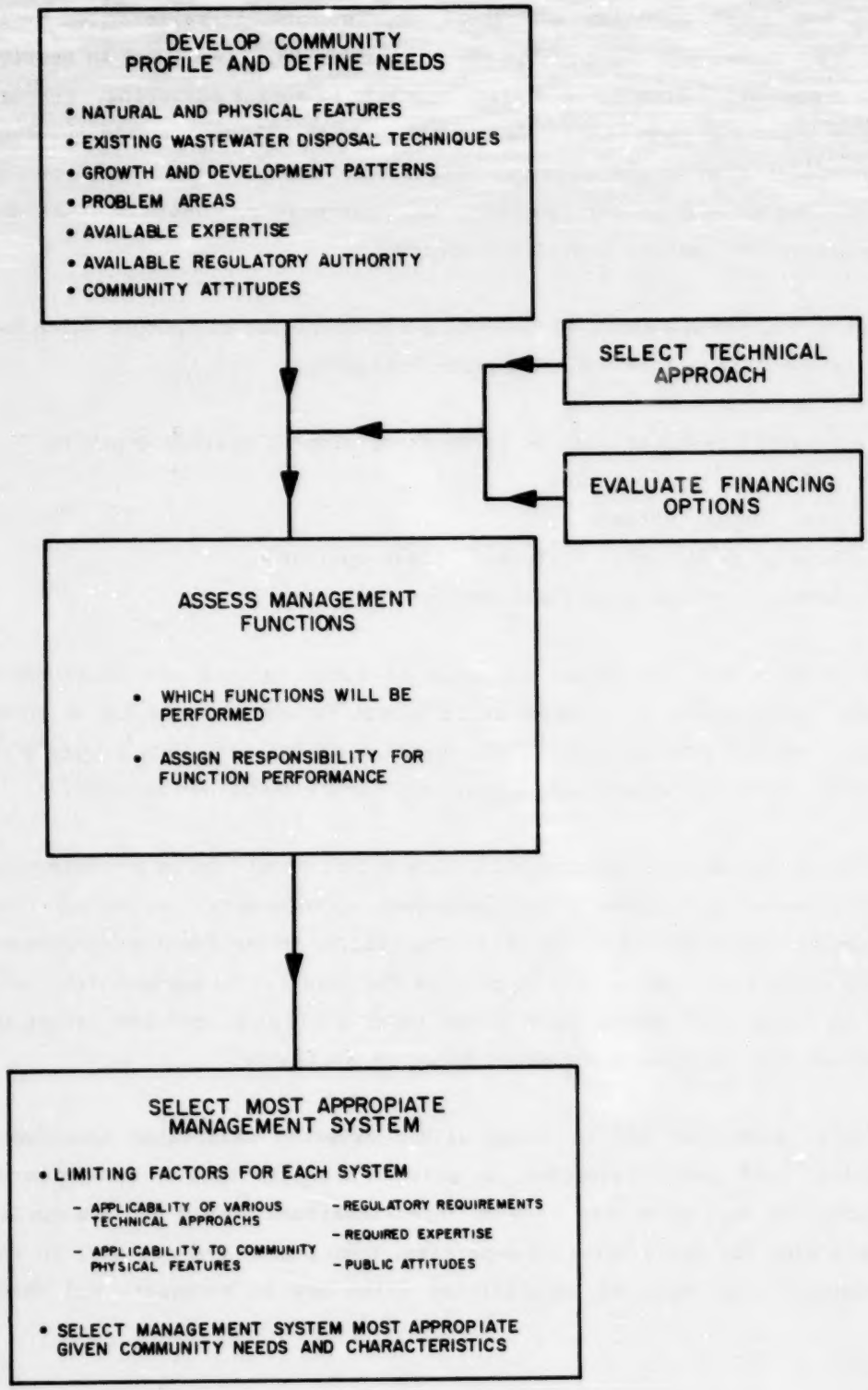
DEVELOP COMMUNITY PROFILE AND DEFINE NEEDS
• NATURAL AND PHYSICAL FEATURES
• EXISTING WASTEWATER DISPOSAL TECHNIQUES
• GROWTH AND DEVELOPMENT PATTERNS
• PROBLEM AREAS
• AVAILABLE EXPERTISE
• AVAILABLE REGULATORY AUTHORITY
• COMMUNITY ATTITUDES
SELECT TECHNICAL APPROACH
EVALUATE FINANCING OPTIONS
ASSESS MANAGEMENT FUNCTIONS
• WHICH FUNCTIONS WILL BE PERFORMED
• ASSIGN RESPONSIBILITY FOR FUNCTION PERFORMANCE
SELECT MOST APPROPIATE MANAGEMENT SYSTEM
• LIMITING FACTORS FOR EACH SYSTEM
- APPLICABILITY OF VARIOUS TECHNICAL APPROACHS
- APPLICABILITY TO COMMUNITY PHYSICAL FEATURES
- REGULATORY REQUIREMENTS
- REQUIRED EXPERTISE
- PUBLIC ATTITUDES
• SELECT MANAGEMENT SYSTEM MOST APPROPIATE GIVEN COMMUNITY NEEDS AND CHARACTERISTICS

FIGURE 4-6

Data which can be collected from secondary sources will, in general, be less expensive than new data collection. Possible sources range from USGS to state and local agencies and local septic tank installers and well drillers. Techniques for problem identification were discussed in Section 4.2. These ranged from water quality sampling to aerial surveying. Current problem areas are identified based on the results of sampling and surveys, and consideration of the physical constraints and potential for improved functioning through proper operation and maintenance. Where systems are inadequate, the reasons should be recorded.

Future needs are assessed based on a consideration of factors which may constrain future system implementation including:

- physical features such as large steep slopes, shallow depth to bedrock or water table
- high quality streams
- lack of permittable surface disposal options
- lack of residuals disposal options.

These factors are considered in light of future growth and development trends. Developable areas which could become future problems due to these or other constraints are identified. Based on this information a summary of physical limiting factors and current and future needs can be made.

The second data collection and review effort should focus on collection of information pertaining to institutional arrangements, regulatory requirements, and community attitudes. The ability to implement a management agency which will then be able to perform the required management functions will in large part depend upon these local attitudes, and the extent of expertise and regulatory authority which is available.

Local expertise may be found within existing wastewater management agencies, other public agencies, or private organizations or contractors. Capabilities available from each of these locations should be inventoried to determine the basic level of expertise, both public and private, in the community. The types of capabilities which may be necessary and which

should be sought would include:

- administrator
- design engineers
- soil scientist
- inspectors
- operators
- laborers
- plumber
- permit administrator
- water resources scientist
- environmental planner
- laboratory technician
- clerical/administrative assistant
- attorney
- public information specialist.

The types of skilled personnel available to the community can directly influence the choice of management functions carried out and the selection of an overall institutional management system. The more functions and greater the level of management proposed, the greater the level and number of skills required. Where the management agency will only be responsible for permitting and compliance, only administrative skills may be required. However, if it is being considered that the agency should assume responsibility for other functions such as planning, system ownership, operation and maintenance, then additional expertise would clearly be required. When decisions are made regarding management functions, consideration must be given to the inventory of available expertise, since any function which cannot be performed by personnel available in the community must be performed by new personnel hired when the management agency is formed or be contracted to private individuals or companies.

Available local regulatory authority is likely to be as great a limitation in design and selection of a management system as any other factor. The functions which the management agency can assume are in large part determined by the statutory and regulatory authorities and limitations

under which it will operate. It is always possible to introduce new legislation or propose regulatory changes which will permit a management agency to perform functions which would otherwise be limited; however, it is recommended that management systems be designed which can perform necessary functions for the most part under existing law and regulations.

There are certain minimal types of authority which any management agency will need to be able to exercise in order to be successful. These powers have been identified previously by others (Otis, 1978) and as presented below have been further modified:

- to own, purchase, lease and rent both real and personal property,
- to meet the eligibility requirements for loans and grants for construction of wastewater (particularly decentralized) systems from both federal and state governments,
- to enter into contracts, undertake debt obligations either by borrowing and/or by issuing stock shares or bonds, and to sue and be sued,
- to fix and collect charges for sewerage usage, including taxes for payment of construction of decentralized systems and user charges,
- to operate and maintain installed units,
- to plan and control how and at what time wastewater facilities will be extended to property within the jurisdiction,
- to regulate the planning, design, construction and operation, and maintenance of decentralized systems, and
- to have right of entry onto private property to inspect for adequate performance or operate and maintain wastewater facilities.

There is a wide range of different entities in each state which may be granted these authorities, including specifically:

- city
- county
- interlocal agreement
- joint management agency
- county service district
- county water & sewer district
- sanitary district
- water & sewer authority
- metropolitan water district
- metropolitan sewerage district
- private corporation
- combination of above.

In general, however, each of these entities is some variation of either a new or existing municipal agency, public authority, special district, joint management agency or private corporation. The characteristics of these different entities are described below.

1. Existing Public Agency - This would include municipal health departments, planning or public works department or other advisory/regulatory agencies. Generally, county agencies would have the same authorities to undertake wastewater management functions as those in incorporated areas (see Tables 4-2 through 4-7).

2. New Public Agency - This would be a new county or municipal agency established specifically for the purpose of managing wastewater needs. It would be provided with all necessary authorities to implement required management functions within the limits of state and local law and regulation.

3. Special District (or Service District) - An independent unit of government with limited powers to provide services (e.g., water supply and/or sewerage services) to an area within a municipality or county. In terms of wastewater services, a special district's powers are generally parallel to those of a municipality or county (The extent of these powers is usually precisely defined by state enabling legislation). Generally, a special district may issue general obligation and revenue bonds, establish rates and charges for services, and levy property taxes. Special districts are

TABLE 4-2

REGULATORY AUTHORITIES OF STATE ORGANIZATIONS

NORTH CAROLINA

Power	City	County	Interlocal Agreement	Joint Management Agency	County Service District	County Water & Sewer District	Sanitary District	Sewer Authority	Private Corporation
Surveys of Sanitary problems/needs	X	X	X	X	X	X	X	X	
Issue general obligation bonds	X	X	X	X	X	X	X		
Issue revenue bonds	X	X	X	X	X	X	X	X	
Impose Assessments	X	X	X	X	X	X		X	
Levy taxes	X	X	X		X	X	X		
Set fees, rates or charges	X	X	X	X	X	X	X	X	
Receive grants/ loans	X	X	X	X	X	X	X	X[2]	
Hold title to all real property of the system	X	X	X	X	X	X	X	X	
Operate System	X	X	X	X	X	X	X	X	
Enter into contracts	X	X	X	X	X	X	X	X	
Install/operate/ maintain systems on private property	X	X	X	X	X	X	X[1]	X	

[1] Sanitary district cannot require installation of sewer lines in new subdivisions or adopt subdivision regulations.

[2] Sewer authority cannot receive federal revenue-sharing funds or community development grants.

Source: Water Resources Research Institute of the University of North Carolina.

TABLE 4-3

REGULATORY AUTHORITIES OF STATE ORGANIZATIONS

KENTUCKY

Power	City	County	Interlocal Agreement	Joint Management Agency	County Service District	County Water & Sewer District	Sanitary District[2]	Sewer Authority	Private Corporation[1]
Surveys of Sanitary problems/needs	X	X	X	X	X	X	X	X	X
Issue general obligation bonds	X	X	X	X	X	X	X	X	
Issue revenue bonds	X	X	X	X	X	X	X	X	
Impose Assessments	X	X	X	X	X	X	X	X	X
Levy taxes	X	X	X	X	X	X	X	X	
Set fees, rates or charges	X	X	X	X	X	X	X	X	X
Receive grants/ loans	X	X	X	X	X	X	X	X	X
Hold title to all real property of the system	X	X	X	X	X	X	X	X	X
Operate System	X	X	X	X	X	X	X	X	X
Enter into contracts	X	X	X	X	X	X	X	X	X
Install/operate/ maintain systems on private property	X	X	X	X	X	X	X	X	X

[1] Only public body can issue general obligation bonds, issue revenue bonds and levy taxes.

[2] A sanitation district is considered a "quasi-public body", but after June 1984 will be subject to Fiscal Court control (legislative body of counties).

Source: Kentucky Natural Resources and Environmental Protection Cabinet.

TABLE 4-4

REGULATORY AUTHORITIES OF STATE ORGANIZATIONS

GEORGIA

Power	City	County	Interlocal Agreement	Joint Management Agency	County Service District	County Water & Sewer District	Sanitary District	Sewer Authority	Private Corporation[1]
Surveys of Sanitary problems/needs	X	X	X	X	X	X	X	X	X
Issue general obligation bonds	X	X							
Issue revenue bonds	X	X	X	X	X	X	X	X	X
Impose Assessments	X	X	X	X	X	X	X	X	X
Levy taxes	X	X							
Set fees, rates or charges	X	X	X	X	X	X	X	X	X
Receive grants/ loans	X	X	X	X	X	X	X	X	2
Hold title to all real property of the system	X	X	X	X	X	X	X	X	X
Operate System	X	X	X	X	X	X	X	X	X
Enter into contracts	X	X	X	X	X	X	X	X	X
Install/operate/ maintain systems on private property	X	X	X	X	X	X	X	X	X

1 Private groups can provide wastewater management services through contractural arrangements.

2 Only public entities can receive grants or loans.

Source: Georgia Department of Natural Resources. Environmental Protection Division.

TABLE 4-5

REGULATORY AUTHORITIES OF STATE ORGANIZATIONS

SOUTH CAROLINA

Power	City	County	Interlocal Agreement	Joint Management Agency	County Service District	County Water & Sewer District	Sanitary District	Sewer Authority	Private Corporation[1]
Surveys of Sanitary problems/needs	X	X	X	X	X	X	X	X	
Issue general obligation bonds	X	X	X	X	X	X	X	X	
Issue revenue bonds	X	X	X	X	X	X	X	X	
Impose Assessments	X	X	X	X	X	X	X	X	
Levy taxes	X	X	X	X	X	X	X	X	
Set fees, rates or charges	X	X	X	X	X	X	X	X	
Receive grants/ loans	X	X	X	X	X	X	X	X	
Hold title to all real property of the system	X	X	X	X	X	X	X	X	
Operate System	X	X	X	X	X	X	X	X	
Enter into contracts	X	X	X	X	X	X	X	X	
Install/operate/ maintain systems on private property	X	X	X	X	X	X	X	X	

1 Private utilities may provide wastewater services, although they may not exercise all the powers of public bodies (including management/planning powers).

Source: South Carolina Department of Health and Environmental Control.

TABLE 4-6

REGULATORY AUTHORITIES OF STATE ORGANIZATIONS

TENNESSEE

Power	City	County	Interlocal Agreement	Joint Management Agency	County Service District	County Water & Sewer District	Sanitary District	Sewer Authority	Private Corporation
Surveys of Sanitary problems/needs	x	x	x	x	x	x	x	x	x
Issue general obligation bonds	x	x	x	x				x	x
Issue revenue bonds	x	x	x	x	x	x	x	x	x
Impose Assessments	x	x	x	x	x	x	x	x	x
Levy taxes	x	x	x	x				x	x
Set fees, rates or charges	x	x	x	x	x	x	x	x	x
Receive grants/ loans	x	x	x	x	x	x	x	x	x
Hold title to all real property of the system	x	x	x	x	x	x	x	x	x
Operate System	x	x	x	x	x	x	x	x	x
Enter into contracts	x	x	x	x	x	x	x	x	x
Install/operate/ maintain systems on private property [1]									

[1] Powers are not covered in laws.

Source: Tennessee Department of Health and Environment.

TABLE 4-7

REGULATORY AUTHORITIES OF STATE ORGANIZATIONS

ALABAMA

Power	City	County	Interlocal Agreement	Joint Management Agency	County Service District	County Water & Sewer District	Sanitary District	Sewer Authority	Private Corporation
Surveys of Sanitary problems/needs	x	x				x	x	x	x
Issue general obligation bonds									
Issue revenue bonds						x	x	x	
Impose Assessments	x	x							
Levy taxes									
Set fees, rates or charges						x	x	x	
Receive grants/ loans	x	x				x	x	x	x
Hold title to all real property of the system	x	x				x	x	x	x
Operate System	x	x				x	x	x	x
Enter into contracts	x	x				x	x	x	x
Install/operate/ maintain systems on private property									

Note: Sewer authorities in resort areas have the same regulatory powers as cities/counties.

Source: Alabama Department of Environmental Management, 1984.

usually created to perform specific functions with costs incurred being paid only by those residing within the district. Special districts can appear as sanitary districts, sanitation districts or utility districts, and can provide single or multiple services (Weston, 1979).

4. Authority - One variation of a special district that is a special unit of government (or a special purpose type of government) authorized to perform specific functions (e.g., provide water and/or sewerage services). Its jurisdictional coverage is flexible; it can be comprised of a municipality, group of municipalities, county, or group of counties. Its revenues are limited to those derived from its water and sewerage operations, and from Federal or state grants for these purposes. It cannot issue general obligation bonds or levy property taxes like a municipality or special district. Again, state enabling legislation defines the powers of an authority (Weston, 1979).

5. Joint Management Agency - Cities and counties and other political subdivisions and agencies of local government are authorized by interlocal agreement to create a joint management agency to administer any undertaking each is authorized to carry out alone. The joint management agency is thus a special form of interlocal contract. Typically, in a simple interlocal contract, one unit administers the undertaking for all participating units. Where a joint management agency is used, a separate agency is created to administer the undertaking.

Units that create a joint agency may confer on it any power, duty, right, or function needed to carry out the undertaking, except that title to all real property needed for the activity must be held by the participating units individually or jointly as tenants in common. The advantage of the joint management agency is that it provides a single administrative structure that is in-

dependent from the administrations of the participating units. It may be especially useful where several units are cooperating and agreement for administration by one of them by contract would be difficult to reach.

The major limitation of the joint management agency is that it is not a unit government. It has no independent taxing capacity, although it may be empowered to issue revenue bonds and it could be authorized to establish rates, fees, and charges for water and sewerage services, for example, and to enter into contracts for construction and for the purchase of apparatus, supplies, materials, and equipment as necessary to operate water and sewerage systems.

6. Private homeowner - Historically, the private homeowner has assumed most functions for individual, on-site wastewater management. He has the authority under state and local laws to undertake most of the necessary functions. However, the homeowner cannot assume responsibility for cluster or centralized systems. Homeowners also have not, in the past, adequately performed operation and maintenance functions without significant public overview.

7. Private (for Profit) - A sole proprietorship or incorporated business such as a septage hauler, plumbing contractor, or private utility formed to provide sewerage services. Private utilities are usually regulated by the state public service or public utility commission (Weston, 1979).

8. Private (Nonprofit) - A property owners' association or a privately owned cooperative can finance and manage sewer services for a specific area. Depending on state legislation, these entities may also be regulated by a public service or public utility commission (Weston, 1979).

Tables 4-2 through 4-7 summarize information on the availability of necessary authorities to each of the specific types of entities listed above. This information is for the states in general and does not address specific authorities of individual cities and towns.

Information on availability of these authorities in North Carolina is presented on Table 4-2. North Carolina statutes allow for the formulation of all of the above organizations to provide wastewater services. Of course, each organization is not necessarily authorized to exercise all functions associated with wastewater management; however, in North Carolina the majority of entities can perform all functions (see Table 4-2). The statutory powers delegated to each type of management agency/organization are presented in Table 4-2 and briefly described here. In addition, North Carolina Statutes allow for the formation of Metropolitan Water Districts (MWD) and Metropolitan Sewer Districts (MSD). These agencies are discussed here, but not presented in the table.

The first three agency types listed, a city, county and an interlocal agreement, are basically authorized through state regulations to undertake all of the powers or functions listed in Table 4-2. The major limitation of the joint management agency wastewater management organization in North Carolina is that, because it is not a unit of government, a joint agency has no independent taxing capacity.

A county service district can perform all functions listed in Table 4-2 since it is not a separate unit of government. The service district is designed to provide services on a less than county-wide basis with full or partial support from property taxes.

A county water and sewer district is a county service district (see above) that is a separate unit of government. Generally, territory within a city or town is not included within a water and sewer district unless the governing body of that city or town agrees. A county sewer district has the

same financing powers as a county. The major limitations with the county sewer district are that each district must be created within a single county and no procedure has been developed to extend a district's boundaries after it is created.

Another entity, the sanitary district, is an independent unit with limited powers. These are relatively prevalent in North Carolina. Basically, the sanitary district has the same powers as a city or county with a few exceptions. Namely, the sanitary district cannot levy special assessments to extend sewer lines, require installation of sewer lines in new subdivisions or adopt subdivision regulations. Sanitary districts may overlap cities.

A water and sewer authority in North Carolina is a unit of government which may provide only sewer and water services. The chief limitations of this organizational approach are that it cannot levy property taxes or issue general obligation bonds. It also does not receive federal revenue-sharing funds, community development grants, local option sales taxes or other state taxes shared with cities and counties. One of the major advantages of this approach is that it can bring together many governmental units when a multi-unit interlocal contract is not possible politically.

The Metropolitan Water District (MWD) is an independent unit of government with financing limitations similar to those of the sanitary district discussed previously. The MWD may only be formed within the boundaries of a single county and none of its revenues may be used for debt service on water and sewerage facilities.

The Metropolitan Sewerage District (MSD) is authorized only to provide sewerage services. Buncombe County in the study area currently has an operating MSD.

A private water and sewerage company is still another option for providing sewerage services in North Carolina. Although many exist in the

state--76 of the states' 100 counties have them (1977 data from the N.C. Utilities Commission; Water Resources Research Institute of the University of North Carolina)--fewer customers are served per system than the publicly-owned ones. As of 1978, 349 companies were subject to regulation by the N.C. Utilities Commission. These companies operated 55 sewer systems, serving an estimated 13,000 sewer customers. (Water Resources Research Institute of the University of North Carolina).

A combination of any of the above organizational arrangements may be implemented in the state. Existing state legislation is flexible enough to permit a combination arrangement to be developed for any area specially suited to its needs.

Information for Kentucky is presented in Table 4-3. According to Kentucky statutes, cities, counties, special districts and private persons are all authorized to engage in the treatment and discharge of wastewater. Counties and special districts may engage in the management of wastewater within their political boundaries, as may designated classes of cities. Only a public body may issue general obligation bonds, issue revenue bonds and levy taxes in the state.

In Georgia (see Table 4-4), any of the organizations presented at the beginning of this section may provide sewerage services. Specific activities which they may undertake, however, are limited. Only a city or county can issue general obligation bonds or levy taxes. Only public entities may receive grants or loans. Private groups can undertake other wastewater activities only through contractural arrangements.

In South Carolina (Table 4-5), again wastewater services may be provided by counties, cities, special purpose districts and private utilities. All of these entities, with the exception of private utilities, may carry out wastewater management activities.

The state of Tennessee also allows for the formation of all of the entities/agencies listed earlier in this section. Regulatory authorities of the various organizations are given in Table 4-6. Basically, the agencies listed in the table have all of the authorities listed with just a few exceptions. The authority to install, operate or maintain systems on private authority is not covered in Tennessee regulations. In addition, special districts may not sell general obligation bonds or levy taxes. Homeowners Associations (one example of a private corporation) have not proven satisfactory for wastewater management in Tennessee (Tennessee Environmental Council). As a matter of fact, the East Tennessee Regional Health Office in Knoxville does not allow Homeowners Associations to possess discharge permits due to difficulties encountered in enforcement (McKinney, 1984).

Table 4-7 presents regulatory authorities of various entities/agencies in the state of Alabama. Alabama statutes allow just six general entities to perform wastewater management activities in the state. These are: counties, municipalities, public corporations, sewer authorities, boards of water and sewer authorities and sewer authorities in resort areas. A combination of these entities can also provide services. Sewerage services cannot be provided by interlocal contracts, joint management agencies or county service districts.

It should be noted that, with the exception of information on North Carolina statutory powers, the above data was derived from questionnaires sent to state personnel (see bibliography). As such, there may be exceptions or prerequisites to performance of any of the powers listed for the various entities. Those exceptions noted in the questionnaire responses are listed as footnotes on each applicable table.

From the information received on the questionnaires and presented on the preceding tables it would appear that in every state virtually any public entity has adequate authority to successfully manage community wastewater needs. However, because this authority is often expressed in very general terms, it requires interpretation of statutes and regulations to determine whether authority to carry out a certain activity is specifically granted. Though the respondents to the questionnaire generally interpret broad authorities to apply to most specific activities, local government officials are often less likely to assume public responsibility for an activity without a specific grant of authority. This may explain why, although broad authority apparently exists, many local governments express the belief that additional legal authorities are needed. For this reason it would be beneficial if state statutes and regulations could be revised to specifically identify all of the activities listed on Tables 4-2 through 4-7 being authorized to all the local entities shown.

A final factor to be developed as part of the community profile is an assessment of community attitudes. Community attitudes on growth, development, public authorities and responsibilities, and environmental quality and management vary throughout the region. These attitudes in turn will strongly affect the functions which can be assumed, the extent of public involvement in carrying them out and the success which is experienced once the management system has been selected. Some information about community attitudes is usually obvious to anyone working in the community as a result of past experiences. Other information can be gained through a questionnaire or door-to-door survey. It is important that sufficient information be given to residents before their opinions are sampled. Once the overall needs for wastewater management and the alternative approaches are clearly described to the community, questionnaires and surveys can provide valuable, sometimes surprising insights into prevailing concerns and attitudes.

With this last piece of information, the first major step in the process of selecting an institutional management system is complete. At this point it should be possible to clearly identify community wastewater needs and

available resources and public opinions concerning ways of meeting these needs.

4.4.2 Identification of Management Objectives

A second major step in determining the most appropriate management system is determining which functions need to be incorporated into the management structure and who will be responsible for carrying them out. It is most desirable that all of the management functions identified in Section 4.2 be performed, however, the choice is left to the community as to which are performed by a public management agency and how the others are performed. If construction grants funding is to be used, EPA requires that projects including on-site or cluster treatment systems, provide for management of the following activities:

- assuming responsibility for the systems including proper installation, operation and maintenance;
- assuring that systems will be constructed, operated and maintained to protect underground potable water sources;
- developing a user charge system;
- obtaining reasonable access to all systems;
- establishing a comprehensive management and periodic inspection program including water well testing.

Beyond these basic requirements, the incorporation and manner of performance of management functions will be affected by many different factors. The most basic factors affecting the selection of management functions to perform are the type of wastewater facilities in the community and the extent of current and existing wastewater problems. As the number and complexity of systems increase and the extent of wastewater problems expands, the need for strong management of monitoring, compliance, operation and maintenance becomes greater. With more systems and more extensive needs, the requirement for central, long-range planning also becomes essential. Decisions about future treatment and disposal techniques can no longer be left to hundreds of individual homeowners.

Natural and physical features of the community will also affect performance of management functions. In communities which have experienced little difficulty with wastewater disposal and have a vast amount of developable land which is readily suitable for on-lot disposal, septic installers or other private contractors may be fully capable of completing system designs. On the other hand, in the difficult physical environment of most mountain communities it may be preferable for system design to be carried out by design engineers employed by the management agency.

Available expertise will also affect the incorporation of various functions. The type of expertise required for certain functions may be quite specialized and the level of effort required may be extensive (see Table 4-8). If there is no expertise available to carry out planning or design, for example, it would mean that these functions would either have to be deleted from the management agency list of responsibilities or be performed by a private organization or contractor. While lack of expertise is clearly not a valid reason for not performing a critical function, it should certainly be considered in terms of management needs and financial and other limitations.

Prevailing state and local regulatory authority will also have a major impact on the functions performed by the management agency. In some states, regulatory authority will not permit certain public management agencies to raise revenues or allow the formation of a private homeowners association to manage wastewater. The regulatory authority to require homeowner maintenance through maintenance permits and other devices may also not be available. All of these factors will affect local decisions as to how to best perform operation and maintenance functions.

Community attitudes toward public management activities should also be considered in deciding which functions to assume. As discussed in the section above, many communities are reluctant to assume any responsibility for operating and maintaining wastewater facilities other than conventional centralized collection and treatment systems. In areas where prevailing

public attitudes are strongly opposed to public involvement, consideration should be given to having various management functions performed by the private sector.

Hand-in-hand with these decisions on which functions to perform, decisions need to be made on who is going to perform them. There are many different types of public agencies which can carry out management functions and there are also many different ways in which the public sector can maintain responsibility for functions while delegating their performance to private entities. Each approach has various advantages which may make it more appropriate for carrying out certain functions in certain communities.

Public entities described in Section 4.4.1 which may be considered for carrying out required management functions include the following:

- existing municipal or county agency
- new municipal or county agency
- special district
- authority
- joint management agency.

A number of non-public entities may also carry out management functions with proper system design. These other entities would include:

- private homeowner
- private, for profit organization
- non-profit private organization.

If a private entity is selected to perform management functions, an arrangement must be made for delegating and supervising this function, otherwise the result is often a lack of management over the function just as existed before overall wastewater management efforts were implemented. A number of methods for delegating or supervising management functions were discussed in the review of techniques in Section 4.2. Of those listed, the following are considered among the most effective for ensuring proper

TABLE 4-8

PERSONNEL REQUIREMENTS FOR VARIOUS MANAGEMENT FUNCTIONS

Function	Person-days Required	Personnel Required[1]	Comments
Problem Identification	12/system	d,f,g,i,j	Inspect septic tank, drainfield and wells; interview homeowner only
System Planning and Design			
Planning	N.E.[2]	m,c	
Set and Review Design Standards	.5/month	c,d,m	
Design Conventional Systems	.25-1/system	a	Involves only design after site analysis completed
Design I/A Systems	.5-2/system	a	
Construction			
Installation			
Inspection	.2/each	d	# may vary dependent on type
Installation	3-8/system	a,f,g,h,i,j	
Permitting	.1/permit	b,c	Involves time involved in permit issuance only
Operation and Maintenance	N.E.[2]	d,f,g,h,i,j,n	Dependent on level of involvement and type of systems
Monitoring and Compliance			
Water Quality Monitoring			
- Well	.1/well	d,f,g,k,l,n	
- Surface water	N.E.[2]	d,f,g,k,l,n	Dependent on type and size of water body and other factors
Enforcement	2/violation	b,c,d,e	Involves inspection and court time
Public Education	.5/month	b,c	

TABLE 4- 8 (cont'd)

[1] Personnel Required

a - System Designers
b - Clerks
c - Administration
d - Inspectors
e - Attorney
f - Soil Scientist
g - Laborers
h - Equipment Operators
i - Plumbers
j - Small Waste Flows Construction and O & M Supervisor
k - Laboratory Technicians
l - Water Resource Scientist
m - Environmental Planner
n - Wastewater System Operators

[2] N.E. + Not Estimatable.

Source: Adapted from Technical Reference Document, Final-generic Environmental Impact Statement, Wastewater Management in Rural Lake Areas, Volume II, U.S. EPA Region V, 1983.

private implementation of management functions:

- certification programs for private contractors
- operating permits for private systems
- maintenance permit forms.

The decision as to whether a function should be carried out by a public agency or private organization, which type of public agency should assume responsibility, and how to delegate functions to private organizations will vary based on differences in the types of community characteristics described in Section 4.4.1.

4.4.3 Selection of Most Appropriate Management System

The final section of this chapter reviews the five management system models initially described in Section 4.3 and characterizes their limiting factors and advantages with respect to different community characteristics. This is the same procedure a community would go through on an individual basis to identify the most appropriate management system for their needs. Through this discussion it will be possible to determine in general terms the type of institutional management approach which is most appropriate given certain community characteristics.

Conventional Homeowner-Centered Management

Under this system, the responsibility for system ownership, operation and maintenance is assumed by private homeowners or private organizations. Private organizations would include any non-public agency that owns wastewater facilities including private utility companies, community and homeowner associations and other organizations. The private owner is responsible for all operation and maintenance functions including the cost of all necessary repairs or system replacement. Public agency functions are typically limited to permitting and investigation of complaints resulting from failure of on-site systems.

The feasibility of private entities assuming responsibility for O&M functions is limited by their understanding of system O&M requirements and the difficulty encountered in performing maintenance tasks. As the complexity of systems increases, greater expertise is required, and the ability of private homeowners to adequately assume these functions decreases. This can be overcome by delegating these functions to private contractors such as septage haulers or septic tank installers.

Since few functions are performed by the public sector, expertise required is limited. Typically, all public management functions can be carried out by the staff of an existing municipal or county agency such as the health or public works departments. With this approach, no new legal authorities are required; fees or charges are minimal and there should be little public resistance to the governmental controls required.

This management approach is normally adequate for rural areas with scattered development, farms and large-tract subdivisions where physical features do not limit the suitability of conventional on-site or clustered systems. Since this system does not include any planning function, the area should also be one where future growth is projected to be limited or where growth can be accommodated on lands which are suitable for conventional treatment and disposal systems. Since system maintenance is, in most cases, not carried out at all and proper operating techniques usually not followed, in high growth areas or communities with physical limitations on-site system failures will occur and can result in impacts to ground and surface water quality.

Conventional System With Monitoring

This management system differs little from the conventional management alternative. It is generally most applicable to conventional on-lot and cluster systems. However, because monitoring is carried out, this approach may be more suitable in areas with a higher number of failing systems,

greater growth rates and less suitable natural conditions. Although the monitoring of system performance will not alleviate existing failures, it will help ensure that new systems are properly operated and maintained and renovated systems continue to function properly in the future. Since planning is typically not provided under this general approach, it may not be the best alternative for areas experiencing explosive second home growth or recreational development. The planning function could be added to this alternative, but it would greatly expand the level of necessary expertise.

Even without incorporation of the planning function, this alternative has increased requirements for staff expertise and legal authorities. The nature of these requirements, however, will vary depending on how the monitoring function is implemented.

If a community determines that a public agency should assume responsibility for monitoring it will be necessary to have the legal authority to enter private property for system inspections on a regular basis. In many jurisdictions this authority may not be specifically granted and new regulations or laws may be necessary. Additional staff will also be needed to carry out these inspections. If a community is small with few systems and little growth projected, it may be possible for existing agency personnel to handle this function.

The selection of a public agency to perform this monitoring will, in large part depend on variations in available legal authority and staff expertise. If an existing agency, such as a city or county health department, has adequate authority and staff it would be the logical choice to assume the responsibility. If new legal authorities and increased staffing are required, there would be advantages to establishing a new special district or authority. Depending on legal limitations, it may be easier in some areas to take this approach.

Because of the legal and staff expertise limitations in some communities and the public resistance to government involvement, it may be

preferable to delegate monitoring to a private entity. Techniques such as revocable system operating licenses and certification of private contractors could be used to ensure that monitoring performed by private contractors such as septage pumpers or system installers is performed properly and on a regular basis.

The advantage of this management alternative is that carrying out of regular monitoring can greatly increase the performance and reliability of all types of wastewater facilities. With the inclusion of monitoring, systems will be more likely to function properly and areas with greater population densities and natural limitations may be more adequately served by on-site and cluster systems. Monitoring can be performed for little increase in fees or charges and, depending on how the function is carried out, public resistance may not be significant.

The limitations of this system are that in many areas, it may be difficult to implement monitoring as a direct public function. Unless it is carried out through a private entity, public resistance could be high. Even using this technique may present problems in terms of legal authorities. Finally, without the planning function, future needs are still not adequately met.

Private Ownership With Required Operation, Maintenance and Monitoring

This management system builds upon the previous example by adding required operation and maintenance to the other management functions. Since systems are still generally owned by private entities under this alternative, it is also most applicable in communities where on-site systems are the most prevalent method of wastewater disposal. However, because operation and maintenance will be ensured, this management approach is also suitable to alternative and innovative on-site and cluster systems as well as small, private package plants or alternative small community systems using land disposal, for example.

It should be pointed out that there are no limitations on the implementation of conventional collection and treatment systems within the

community under this management system. The assumption has been made throughout this section, though, that such systems would be entirely publicly-owned, operated and maintained. As such, they will be discussed under the final management alternative. In some locations in the study area there have been privately-owned small community collection and treatment systems, and it is possible that systems managed in this way may once again begin to be implemented. Such systems may be appropriate for large recreational developments, or communities where privatization of facilities has financial or management advantages. If such a system were implemented, it would be best that the community have a management system with a level of public control at least as great as discussed under this alternative--that large scale privately-owned treatment systems not be permitted unless the community is prepared to implement a program to ensure adequate operation and maintenance and carry out monitoring to verify that adequate O&M procedures are being followed.

With the addition of required O&M, this management alternative becomes even more applicable to communities where extensive growth or physical limitations may present the potential for wastewater management problems. Although this system is not defined as including the planning function, it should be reemphasized that there is no rigid structure which limits the inclusion of this function. For the sake of consistent organization of this section, planning is addressed under the last alternative, though a community could decide to carry out this function or contract to have it carried out under any of the alternatives. A community whose profile shows significant projected growth or the probability of significant wastewater management problems should implement planning as part of its management program.

The required operation and maintenance functions can probably be carried out with little additional staff expertise or legal authorities, since under this management alternative O&M functions would not be directly performed by the public agency. Existing legal authorities would probably be sufficient in most states to require maintenance functions to be carried out where systems are malfunctioning and causing a potential public health

problem. However, additional authorities may be necessary before a public agency can require preventive maintenance and specific operating procedures to be followed. There are a variety of techniques available to carry out this requirement if the legal authority is available. Among those initially described in Section 4.2 which would be appropriate are:

- revocable operating license
- deed attachment
- septage collection and disposal program
- maintenance permit forms
- service call light system.

Despite the possible need for additional legal authorities, this alternative provides a good middle-of-the-road approach to institutional management. Adequate management functions are carried out to assure reliable performance of a wide variety of system types. The approach is suitable in both low growth, sparsely populated communities, as well as larger ones experiencing greater growth pressure. Additional public costs are not excessive and the level of public control is not so extensive that public resistance could be a significant problem.

Private Ownership With Public Operation and Maintenance

This management alternative differs from the above approach in that the operation and maintenance function is performed directly by the public management agency instead of being required of the private system owners. This alternative comes close to what could be termed a "cradle-to-grave" system in that, while the homeowner or other private party retains ownership of the wastewater facilities, all other functions are provided for by the management agency. This approach would be applicable to communities similar to those suitable for the above alternative, however, its application could be limited because of the level of expertise and regulatory authorities required, and by the reluctance of private citizens in many areas to accept such a high level of public agency involvement.

The addition of operations and maintenance functions to the other public management responsibilities results in significantly expanded requirements for staff expertise and legal authorities. Since O&M functions would be carried out entirely by a public agency, there would be increased needs for expertise such as inspectors, operators, laborers, plumbers and for clerical and administrative assistance. Construction equipment would also be necessary for repair and replacement of systems. The staff requirements can be lessened by the use of operator circuit riders, for example, but the number of staff and range of expertise required may still be beyond the range of many mountain communities.

These personnel would also need to have regular access to private property to carry out O&M functions. Such authority may be available through easement agreements and deed restrictions or other techniques. These are general mechanisms for gaining rights-of-entry and the ability to use them for this particular purpose may vary from state-to-state.

These same issues will also affect the selection of an appropriate public agency to carry out operation and maintenance functions. If a city or county health department is the preferred agency it is unlikely that these functions could be assumed. Few health departments have the necessary staff expertise, and in some states, health department personnel may be limited in their rights-of-entry. It is more likely that adequate authority and expertise would be available if the implementing agency were a special district or authority.

Overall, the advantages of this system are that it provides certain control over nearly all phases of wastewater management. It can ensure adequate system performance and wastewater treatment for all types of systems even in areas where physical features or extensive future growth may present problems in managing wastewater.

On the other hand, to implement this alternative requires an agency with extensive staff expertise and broad regulatory authority. But the greatest limiting factor for this approach is the potential for public resistance.

This could come on two fronts. First, private homeowners would have to pay to have the operation and maintenance functions for on-site systems performed by the public agency. Though these functions should be carried out by homeowners they are typically not performed under the conventional management system currently in place in most communities. Therefore, the homeowner is not aware of their costs. Secondly, to the extent that a homeowner is willing to expend the funds for necessary O&M, most would be more likely to contract privately for such services. In general, citizens in many communities may resist the public sector's assuming responsibility for such extensive management functions.

Appendix III-A presents two sample management contracts currently used in the Commonwealth of Kentucky by the Water Resources Assistance Corporation (WRAC). WRAC, a non-profit corporation, provides financial and field management services to various entities which are not large enough to economically provide these services themselves. The basic concept of the WRAC program is that of the "Private Ownership With Public Operation and Maintenance" management system. The two contracts presented in Appendix III-A detail WRAC's responsibilities under each management program. They could also be used, however, to contract with a private, for profit organization.

Public Sector-Oriented Management

Under this management alternative a public agency assumes ownership of all wastewater facilities and either performs or has performed all of the necessary management functions. This approach is typical in more populous urban and suburban areas where conventional centralized collection and treatment systems are prevalent. Though it is most likely that public ownership of facilities would be applied to large-scale conventional treatment plants and sewers, such an approach also may be applied to small community, cluster and on-site systems. Complete public responsibility may be the preferred approach for communities with numerous wastewater problems, extensive growth and natural or socioeconomic limitations.

This system has the most extensive requirements for expertise and legal authorities of any of the management alternatives. Since all systems are publicly-owned and maintained, the number of plant operators needed could be extensive. There would also be a requirement for numerous staff individuals familiar with on-site system design, installation, operation and repair. Equipment requirements could also be extensive. The planning function would also be carried out under this approach, therefore, there would be a need for environmental planners and staff with related planning disciplines. The alternative to staff expertise in this area would be to delegate the planning function to a contractor.

A system such as this which concentrates management functions with the public sector also requires extensive regulatory authorities in order to carry out these functions. In addition to the authorities required for previous alternatives the key authority necessary would be the ability to own wastewater facilities, including septic tanks and disposal fields on private property. There is some type of management agency in all states with the power to own property and facilities. Therefore, public acquisition of newly constructed systems would not seem to present any legal problems. However, acquiring ownership of existing systems owned by the homeowner may present legal problems and elicit homeowner opposition. This could be a problem particularly with a management district which encompasses more than one jurisdiction.

Some of these limitations may be overcome by selection of the proper agency to implement the management functions. The agency would need to have extensive staff expertise and regulatory authority. If possible, it should be able to carry out planning functions. Expertise to provide useful public education services would also be beneficial. An agency such as a special sewer district which can issue bonds, own property and have the flexibility to operate within different jurisdictional settings would be appropriate to implement this management system.

Community attitudes toward public involvement affect decisions concerning the ownership of wastewater facilities. In many communities there may be widespread acceptance of public ownership of centralized collection and treatment facilities, yet there may be a correspondingly strong belief that ownership of on-site systems be maintained by private homeowners. Such attitudes may cause the public to be resistant to this management alternative.

The advantages of this system include the fact that private individuals and organizations are relieved of any liability associated with management of wastewater facilities. Homeowners and private organizations also would be spared the cost of system repairs and major capital expenditures from failure of their systems. Under this alternative the greatest degree of water quality and public health protection would be obtained. A system such as this is fully applicable in communities which have had a high incidence of wastewater problems and where future problems are forecast.

There also are significant limitations to this approach. Costs for a large agency staff would be high. Also, the costs incurred in accepting liability for repairs and replacement of systems would be significant. Under an averaging method of assigning costs, individuals would pay equal shares of the expense of failing systems and system replacement regardless of their own level of needs. As mentioned above regarding system ownership, many individuals may object to this cost sharing for on-site systems, despite the fact that it is the typical approach for conventional centralized systems.

The levels of staff expertise and regulatory authority are extensive and the need for a large, broad-based public agency is probable. Given all these factors, such an all-encompassing approach may not be most appropriate for many mountain communities. Though there are significant benefits to this approach, the implementation problems may outweigh them in all but the most populous metropolitan portions of the region in which other "urban-type" services are provided.

This chapter has presented a great volume of information about alternative institutional management systems including the management functions which must be carried out, different techniques which may be used for each function, five alternative system models which may be used to coordinate overall management functions, and a procedure for identifying the management system most appropriate for a specific community.

The management system models presented vary primarily in the degree of public sector control which is exercised. There is a range from nearly no public involvement to total public ownership and control Along with the variation in degree of public control there are different requirements for staff expertise, legal authorities, level of public involvement and costs.

The selection of a management system most appropriate for a particular community will hinge largely on consideration of these requirements, along with a determination of existing and future wastewater need and problems. The actual management system which is selected based on these factors will in most cases never be exactly the same as any of the five models. There will always be some changes in the responsibilities for particular functions or the techniques which are used to carry them out. However, for any management system to be successful there must be some formal procedure provided for carrying out all seven of the key management functions:

- problem identification
- system planning and design
- construction and installation
- permitting
- operation and maintenance
- monitoring and compliance
- training and public education

The most appropriate management system for mountain communities will be that which successfully carries out each of these functions with the most cost efficiency and widest degree of support from the communities resi-

dents. That will not always be the system with the greatest degree of direct public-sector control.

It is important to note here that most communities in the study area are unfamiliar with the management system concept. Therefore, lack of knowledge or experience on the part of both the public official and the resident may make management system implementation difficult. Smooth introduction of the system to the community, in this case, may require phasing. This procedure introduces the system, one phase at a time, possibly resulting in greater understanding and therefore, greater acceptance of the management process.

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Figure 4-1

Conventional Homeowner-Centered Management

DESCRIPTION OF SYSTEMS

The traditional homeowner-centered approach involves a private party such as a homeowner owning, operating and maintaining the wastewater system. A public agency such as a county or city health department would be responsible for ensuring compliance with health regulations. This system is generally utilized in areas where the primary type of wastewater facility is the septic tank-soil absorption field.

RESPONSIBILITY CENTERS

Problem Identification--not necessarily the responsibility of any one party since problem identification is not routinely carried out. Generally, if the health department is the implementing agency, they carry out problem identification functions on an as-needed basis.

Planning--not normally carried out unless a problem arises.

Design--Private septic installation contractors.

Operation and Maintenance--Homeowner.

Monitoring and Compliance--Public agency, e.g. health department.

Public Education-Not a required responsibility of any agency/entity, although public agency may elect to carry out education activities.

RESOURCE REQUIREMENTS

Vary with community size but can range from two to five or more individuals including a department director, registered sanitarians, inspectors, clerical and administrative support. Soil augers and soil survey information are main materials and equipment needs. Private contractors provide construction equipment.

EXAMPLES AND CONTACTS

Typical system in most non-urban communities in the United States.

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Figure 4-2

Conventional System With Monitoring

DESCRIPTION OF SYSTEMS

In this system, wastewater facilities are generally privately owned and operated, however, a public agency is responsible for scheduled monitoring, permitting and compliance. This system would be applicable in areas primarily using septic systems and also in areas where cluster systems are owned and operated by a homeowners association or another private organization.

RESPONSIBILITY CENTERS

Problem Identification--No formal process, however the public agency may identify problems through the monitoring process.

Planning--Not carried out by any party.

Design--Private septic installation contractors with assistance by the implementing public agency if it is a special district or a wastewater authority.

Operation and Maintenance--Private homeowner or association.

Monitoring and Compliance--Public agency (e.g. health department); homeowner; private contractor.

Public Education--Not a required responsibility of any agency/entity, although public agency may elect to carry out education activities.

RESOURCE REQUIREMENTS

Basically similar to those of the Traditional Homeowner-Centered Approach, with from two to five or more individuals including a department director, registered sanitarians, inspectors, and clerical and administrative support. Soil augers, soil survey information and water quality tools are the main equipment requirements. Construction equipment and lab facilities provided by private contractors (typically).

EXAMPLES AND CONTACTS

Madison County, N.C. On-Site Management District.
Mike Bradley
Madison County Health Department
Route 7, Box A
Marshall, NC 28753
(704) 255-0695

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Figure 4-3

Private Ownership with Required Operation, Maintenance and Monitoring

DESCRIPTION OF SYSTEMS

Wastewater facilities are owned, operated and maintained by a private party (generally a homeowner). The public agency (possibly a health department) implements a procedure for ensuring maintenance and is also responsible for permitting and compliance. This system is generally applicable in areas using septic systems, in areas where cluster systems are owned and operated by a homeowners association or another private organization and where privately-owned conventional systems are used.

RESPONSIBILITY CENTERS

Problem Identification--No formal process, however the public agency may identify problems through the monitoring process.

Planning--Not normally carried out by any party.

Design--Private system design and installation with assistance by the implementing agency if it is a special district or a wastewater authority.

Operation and Maintenance--Private homeowner or association; public agency when homeowner fails to produce proof of maintenance.

Monitoring and Compliance--Public agency; homeowner; private contractor.

Public Education--Not a required responsibility of any agency/entity, although public agency may elect to carry out education activities.

RESOURCE REQUIREMENTS

Basically, these include a public agency department director, registered sanitarians, inspectors and clerical and administrative support. Necessary equipment includes that needed for water quality monitoring, soil augers and soil surveys. Private contracts could be used for system design and installation and for water quality testing lab facilities.

EXAMPLES AND CONTACTS

- Marin County, California health department biennial inspection program.
- Stinson Beach, California. Water district manages both new and old on-site and alternative systems. District is responsible for inspection, monitoring and enforcement.
  Stinson Beach County Water District, Water Quality Supervisor.

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Figure 4-4

Private Ownership with Public Operation and Maintenance

DESCRIPTION OF SYSTEMS

The private ownership/public operation, maintenance and monitoring approach involves individual ownership with public operation, maintenance and monitoring. The public agency would also be responsible for permitting and enforcement of compliance measures. This type system, because of extensive requirements for personnel resources, is generally only feasible in areas of moderate-to-high use of individual septic systems or cluster systems.

RESPONSIBILITY CENTERS

Problem Identification--not routinely carried out by any one party. Problem identification functions are carried out on an as-needed basis by the public management agency.

Planning--not typically carried out on a formal basis unless a problem arises.

Design--Private contractors.

Operation and Maintenance--Public agency, private contractors.

Monitoring and Compliance--Public agency.

Public Education--Not a required responsibility of any agency/entity, although public agency may elect to carry out education activities.

RESOURCE REQUIREMENTS

Varies with size of planning area, however, with functions which must be performed by the public agency, three to five or more system inspectors and three to five or more registered sanitarians and relatively extensive clerical and administrative support would be necessary. Main equipment resources needed include water quality monitoring accessories, and soil augers and surveys. Construction equipment and lab facilities may be provided by private contractors, however, number of functions performed by the public agency may make owning this equipment cost-effective.

EXAMPLES AND CONTACTS

- Georgetown Divide Public Utility District (GDPUD). District manages on-site and alternative systems through following functions:

  - site evaluations,
  - design,
  - inspections,
  - monitoring.

  Water Quality Superintendent, GDPUD, Georgetown, California.

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Figure 4-5

Public Sector - Oriented Management

DESCRIPTION OF SYSTEMS

Involves total public responsibility for the wastewater system from problem identification and planning to performance of operation and maintenance and monitoring activities. The public agency can contract out or delegate much of its responsibility to a private contractor or the homeowner. Applicable in areas that are moderately-to-highly developed with individual on-site systems, cluster systems, small community systems and conventional centralized facilities.

RESPONSIBILITY CENTERS

Problem Identification--Public agency.
Planning--Public agency; private contractor.
Design--Public agency; private contractor.
Operation and Maintenance--Public agency; homeowner; private contractor.
Monitoring and Compliance--Public agency (some private contractor).
Public Education--Public agency.

RESOURCE REQUIREMENTS

Personnel required include: department director, sanitarians, inspectors (soil and water quality monitoring), planners, design engineers, and septage pumpers and haulers. Equipment includes soil augers, soil surveys, water quality monitoring materials and septage trucks and pumping tools. Contractors provide their own equipment.

EXAMPLES AND CONTACTS

No publicly managed on-site or cluster systems currently in operation in the study area. Typical of any publicly-owned centralized small community or conventional collection and treatment system in the study area.

Specific examples:

- City of Hinesville, Georgia. Plant is being constructed jointly by the city and the Army. Following operation, the city will assume operation for the Army's portion of the plant.
  Mr. Billy Edwards,
  City Administrator
  (912) 876-3564
- General Development Utilities (GDU), Inc., Florida. Publicly-regulated private utility owns, operates and maintains septic tank-effluent pump systems at two developments.
  GDU, Sanitary Engineer, Miami, Florida.

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CHAPTER 4 BIBLIOGRAPHY

BIBLIOGRAPHY

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VOLUME III APPENDICES

APPENDIX III-1 FINANCIAL AND FIELD MANAGEMENT
CONTRACT AND FINANCIAL MANAGEMENT
CONTRACT

APPENDIX III-1

WATER RESOURCES ASSISTANCE CORPORATION -
FINANCIAL AND FIELD MANAGEMENT CONTRACT

1. Water Resources Assistance Corporation, hereafter WRAC, is a non-profit corporation established to provide various services to water districts, municipal water systems and related entities.

2. _____, hereafter Water System, is a Water District providing water service in _____ County, Kentucky.

3. Water System has determined that it is in the best interest of its consumers to have WRAC provide exclusive financial and field management services to the System. These services are to consist of operating the system, connecting customers, reading the meters, preparing and sending bills, collecting revenues, making repairs, water sampling, keeping financial records, making reports to regulatory and funding agencies, and other related financial and field management services as are set out below.

4. WRAC does not assume responsibility for any existing contractual or financial obligations of the Water System, but will collect the bills, keep the financial records and recommend action on financial obligations to the Water System. WRAC will maintain Water System inventory of materials and supplies pursuant to the execution of this contract. WRAC will also oversee for the Water System any special contract services, i.e., line extension contracts, etc., to the same extent that the District would so function exclusive of professional service contracts. In instances where it is necessary to obtain extraordinary services or supplies from an outside source, WRAC will not obligate Water System for any such obligations without prior approval of the Water System except in the case of emergencies, and

APPENDIX II-A

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will in those instances make every attempt to obtain prior approval from an authorized agent of the Water System.

5. WRAC's policy requires that WRAC treat each Water System with which it contracts as a separate and distinct entity. WRAC will therefore maintain separate records and bank accounts enabling it to do so. The Water System shall designate an FDIC insured bank to be used as a depository for funds received on its behalf by WRAC, and all such funds will be maintained in a separate account in Water System's name in that bank.

6. WRAC will maintain office hours from 8:00 a.m. to 4:30 p.m. weekdays (excepting legal holidays). WRAC will arrange for staff to attend the monthly meeting of the Board of Commissioners of the Water System. WRAC will assign personnel to respond to emergency problems outside of normal working hours (see Section 14 below). It is understood that all other services will be performed during normal working hours.

7. BILLING: WRAC agrees to read the customers meters, prepare and send monthly bills, including delinquent and disconnect notices, to receive payment and deposit them to Water System credit in the designated bank, and to prepare and maintain appropriate billing records including:

a. A customer profile card for each customer.

b. A customer folder for each rental unit.

c. A monthly billing register containing information on all accounts billed.

d. A monthly billing journal

e. A monthly consumption report

8. ACCOUNTING: WRAC will maintain Water System's accounts in a form where all separate accounts required by the Kentucky Public Service Commission,

bond ordinances, or sound management practice can be readily ascertained. WRAC will prepare monthly statement of accounts, will balance the accounts and do reconciliations, and will also prepare projections of income and expenses where appropriate.

9. REPORTS: WRAC will prepare and file all periodic reports required by state and federal funding and regulatory agencies and will in addition provide routine data to support rate increase applications.

10. PAYMENT OF BILLS: WRAC shall at the monthly meeting of the Board of Directors of the Water System report on revenues, showing sources, funds available, and obligations. WRAC will make recommendations to the board as to obligations requiring payment. Upon authorization by the Water System, WRAC shall prepare checks for signature by the Chairperson or other designated member of the Water System Board of Commissioners.

11. OPERATIONS: WRAC will perform all routine operating functions including:

a. New residential connections to existing system
b. Reconnections
c. Disconnects
d. Meter changes
e. Water sampling and records
f. Water testing and records
g. Chemical treatment and records
h. Master meter reading and records
i. Visual inspection of facilities
j. Flushing lines as required
k. Maintaining system maps

12. MAINTENANCE: WRAC will perform all routine maintenance functions including repairing water leaks not requiring replacement or renewal of conduit or appurtenances and routine maintenance of all facilities owned by the Water System not requiring replacement or renewal of facilities, but

specifically excluding repainting of water towers and pump houses.

It is understood and agreed that this Agreement shall apply only to routine operations and maintenance necessary to provide service to customers of the Water System, and shall be limited to normal repairs and scheduled maintenance.

Repairs to the system shall be deemed normal maintenance if such repairs do not require complete replacement of a major component, i.e., section of piping, major control mechanism, pump, water meter, electric motor, etc. The Corporation shall exchange from the inventory customer meters as required to maintain continuity of service and billing for the consumer, but is not responsible for repairs to such meters.

13. NON-EMERGENCY RENEWAL AND REPLACEMENT AND SYSTEM EXTENSIONS: WRAC agrees to make non-emergency renewal and replacements, extensions of the system, and new commercial-industrial connections, if it has personnel and facilities available for such services, at its cost. Such services shall be performed only after a cost estimate has been made by WRAC and approved by the Water System. In addition, it is understood that no line extensions shall be made unless same is subject to the standard Water Extension Contract as approved by the Board of Commissioners and no new commercial-industrial connections shall be made unless in accordance with the rules and regulations of the Water System. All such services are in addition to the services under the basic contract and are not covered by the basic contract charge.

14. EMERGENCY RENEWAL AND REPLACEMENT: In the case of an emergency situation, WRAC shall attempt to contact the appropriate agent of the Water System to obtain approval of immediately required renewal and replacement. However, it is understood that if no such contact can be made, WRAC is

authorized to make those repairs necessary under the circumstances, and to be compensated for the actual cost of the repairs including time and one-half the normal salary rate of employees, as required by law, in addition to the basic contract charge.

15. INVENTORY: WRAC agrees to maintain a complete inventory of materials and supplies as required for the routine operation and maintenance of the Water System. The Water System will be invoiced for supplies and materials as same are acquired and/or placed in service.

16. COMPENSATION: WRAC shall commence to perform all of the above described services on_____for a charge to the Water System of $_____per month per residential equivalent customer billed.* Water System agrees to pay WRAC a sum equal to the number of residential equivalent customers billed the prior month times the monthly rate each month beginning one month after service is commenced. Water System also agrees to pay WRAC for all other services rendered under this contract or which may be agreed to in addition to the contract thirty (30) days after such services are rendered.

17. RENEGOTIATION OF AMOUNT OF COMPENSATION: WRAC shall at the close of the second quarter review all services performed under the contract and tabulate the total receipts under this contract and provide such information to the Water System. If the amount of revenue received is greater than the actual costs of providing these services by more than 10%, the charge per month per customer billed shall be adjusted proportionately for the remaining two quarters of the contract year.

18. COSTS: For the purpose of computing cost under this contract,

* Calculated on the basis of_____ _____customers.

WRAC shall maintain records of materials and supplies and employee and equipment time utilized in performing services under this contract. Employee time shall include employee benefits, employer taxes and other costs directly related to the payment of wages. Equipment time shall include operating and and maintenance costs, depreciation, finance charges and other charges directly related to the utilization of the quipment. Administrative overheads including supervisory salaries, rents, utilities, interest cost on inventory, office equipment, and related charges may be allocated directly, as a percentage of other charges, or on a per customer basis, using generally acceptable principles of cost accounting.

19. POWERS: The Water System hereby authorizes the Corporation to act as agent for the Water System in carrying out the functions that WRAC has agreed to perform. WRAC agrees to obtain insurance to protect itself and the Water System against any error or omissions by itself or its employees as available and to inform the Water System of the limits and coverage of the insurance that has been obtained. WRAC shall also provide fidelity bond coverage by an insurance company on all WRAC employees handling Water System funds.

20. DURATION: The contract shall become effective and shall remain in effect for a period of one year from effective date given above, provided however, that the charge for succeeding years will be established as set out in Sections 17 and 18 above. An executed copy of this contract shall be submitted to the Economic Development Administration (EDA) as per direction of that Agency. Notice of termination of contractual arrangement may be given by either party for cause upon 30 day written notice to the other party, upon written approval of the EDA and/or its successors.

21. Authorized agent(s) of the Water System pursuant to Sections 4, 10, and 14 above is/are:

Chairman and/or Commissioner(s)

22. Depository Bank for Water System pursuant to Section 5 above is

_____ _____

IN WITNESS WHEREOF, the Water Resources Assistance Corporation, a non-profit Corporation, and the _____, a Water System, have caused their corporate name to be signed hereto, attested by their duly authorized officers, on respective dates as hereinafter set forth:

ATTEST:

Water Resources Assistance Corporation

BY:_____

BY:_____

Date:_____

ATTEST:

_____

Water System

BY:_____

Title

BY:_____

Chairman

_____

Commissioner

_____

Commissioner

U3-11

State of Kentucky
County of_____

I, the undersigned, a Notary Public in and for said County, in said State, certify that_____, whose name as Chairman of the Water Resources Assistance Corporation, a Corporation, is signed to the foregoing instrument and who is known to me, acknowledged before me on this day, that, being informed of the contents of such instrument, he, as such officer, and with full authority, executed the same voluntarily, for and as the act of said Corporation.

Given under my hand, this the_____day of_____19____.

_____
Notary Public

My Commission Expires_____

State of Kentucky
County of_____

I, the undersigned, a Notary Public in and for said County, in said State, hereby certify that_____, whose name as_____of the_____, a water system is signed to the foregoing instrument and who is known to me, acknowledged before me on this day, that being informed of the contents of such instrument, he, as such officer, and with full authority executed the same voluntarily, for and as the act of said water district.

Given under my had, this the_____day of_____19_____.

_____
Notary Public

My Commission Expires_____

V3-12

FINANCIAL MANAGEMENT CONTRACT

1. Water Resources Assistance Corporation, hereafter WRAC, is a non-profit corporation established to provide various services to small water districts, municipal water systems and related entities which are not large enough to economically provide such services for themselves.

2. _____, hereafter Water System, is a Water District providing water service in _____County, Kentucky.

3. Water System has determined that it would be more economical and efficient to have WRAC provide financial management services to the Water System than to continue to perform such services for itself. These services are to consist of reading the meters, preparing and sending the bills, recording invoices and recommending payment of bills, preparing reports, and other related bookkeeping and financial management functions as are set out in more detail below.

4. WRAC does not assume responsibility for any contractural or financial obligations of the Water System, but will merely collect bills, keep the financial records, and recommend action on financial obligations to the Water System. It is understood that this agreement can in no way alter, change, lessen or mitigate contractual obligations of the Water System.

5. WRAC's policy requires that WRAC treat each Water System with which it contracts as a separate and distinct entity. WRAC will therefore maintain separate records and bank accounts enabling it to do so. The Water System shall designate an FDIC insured bank to be used as a depository for funds received on its behalf by WRAC, and all such funds will be maintained in a separate account in Water System's name in that bank.

6. WRAC will maintain office hours from 8:00 a.m. to 4:30 p.m. weekdays (excepting legal holidays) and will be available during those hours to answer questions regarding bills. WRAC will arrange for staff to attend the monthly meeting of the Board of Directors of the Water System. It is understood that all other services will be performed during normal working hours.

7. BILLING: WRAC agrees to read the customer meters, prepare and send monthly bills, including delinquent and disconnect notices, to receive payment and deposit them to Water System credit in the designated bank, and to prepare and maintain appropriate billing records including:

a. A customer profile card for each customer.

b. A customer folder for each rental unit.

c. A monthly billing register containing information on all accounts billed.

d. A monthly sales report.

e. An open balance register.

8. ACCOUNTING: WRAC will maintain Water System's accounts in a form where all separate accounts required by the Kentucky Utility Regulatory Commission, bond ordinances, or sound management practice can be readily ascertained. WRAC will prepare monthly statement of accounts, will balance the accounts and do reconciliations, and will also prepare projections of income and expenses where appropriate.

9. REPORTS: WRAC will prepare and file all periodic accounting and financial reports required by state and federal funding and regulatory agencies and will in addition provide routine financial data to support rate increase applications.

10. PAYMENT OF BILLS: WRAC shall at the monthly meeting of the Board of Directors of the Water System report on revenues, showing sources, funds available, and obligations. WRAC will make recommendations to the board as to obligations requiring payment. Upon authorization by the Water System, WRAC shall prepare checks for signature by the Chairman or other designated member of the Water System Board of Directors.

11. INVENTORY: The Water System will give WRAC its existing inventory of billing and accounting materials and supplies. WRAC will supply all future billing and accounting materials and supplies.

12. COMPENSATION: WRAC shall begin providing the above-described services on_____for a charge to the Water System of $_____per month per customer billed. Water System agrees to pay WRAC a sum equal to the number of customers billed the prior month times the monthly rate each month beginning one month after service is commenced. The Water System and WRAC may also agree for WRAC to furnish additional services not specifically designated above. Such an agreement shall be in writing, and shall set out the amount to be paid or the rate at which such amount is to be computed. Sums owing under such agreements shall also be due and payable the month after the services are rendered.

13. RENEGOTIATION OF AMOUNT OF COMPENSATION: During the first year of this contract, WRAC shall at the close of each quarter review all services performed under this contract and tabulate the total receipts under this contract and provide such information to the Water System. If the amount of revenue received is greater than the actual costs of providing these services by more than 10%, the charge per month per customer billed shall be adjusted proportionately.

14. COSTS: For the purpose of computing cost under this contract, WRAC shall maintain records of materials and supplies and employee and equipment time utilized in performing services under this contract. Employee time shall include employee benefits, employer taxes and other costs directly related to the payment of wages. Equipment time shall include operating and maintenance costs, depreciation, finance charges and other charges directly related to the utilization of the equipment. Administrative overheads including supervisory salaries, rents, utilities, interest cost on inventory, office equipment and related charges may be allocated directly, as a percentage of other charges, or on a per customer basis using generally acceptable principles of cost accounting.

15. POWERS: The Water System hereby authorizes the Corporation to act as agent for the Water System in carrying out the functions that WRAC has agreed to perform. WRAC agrees to obtain insurance to protect itself and the Water System against any errors or omissions of itself or its employees and to inform the Water System of the limits and coverage of the insurance that has been obtained. WRAC shall also provide fidelity bond coverage by an insurance company on all WRAC employees handling Water System funds.

16. DURATION: The contract shall become effective _____ and shall remain in effect for a period of one year. It may be renewed for periods of one year thereafter, by the Eater System, provided, however that the charge for succeeding years will be based on the actual cost for the prior year after adjustment for known changes.

IN WITNESS WHEREOF, the Water REsources Assistance Corporation, a non-profit Corporation, and a water utility system have each caused their corporate name to be signed hereto, and their corporate seal to be affixed and attested by their duly authorized officers, on this the _____day of _____19_____.

ATTEST: Water Resources Assistance Corporation

BY:_____ BY:_____
Secretary President

ATTEST: _____
Water District

BY:_____ BY:_____
Secretary Chairman

State of Kentucky

I, the undersigned, a Notary Public in and for said County, in said State, certify that Bill H. Howard, whose name as Chairman of the Water Resources Assistance Corporation, a Corporation, is signed to the foregoing instrument and who is known to me, acknowledged before me on this day, that, being informed of the contents of such instrument, he as such officer, and with full authority, executed the same voluntarily, for and as the act of said Corporation.

Given under my hand, this the_____ day of_____1979.

_____
Notary Public

My Commission Expires_____.

V3-17

State of Kentucky

I, the undersigned, a Notary Public in and for said County, in said State, hereby certify that_____, whose name as_____ of the_____a special water system is signed to the foregoing instrument and who is known to me, acknowledged before me on this day, that being informed of the contents of such instrument, he, as such officer, and with full authority executed the same voluntarily, for and as the act of said water district.

Given under my hand, this the_____day of_____1979.

_____
Notary Public

My Commission Expires_____.

*U.S. GOVERNMENT PRINTING OFFICE:1984 -545-066/

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